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EPSON

TM-P60

Specification

STANDARD	
Rev. No.	I
Notes	

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SEIKO EPSON CORPORATION

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REVISION SHEET

The table below indicates which pages in this specification have been revised.
Before reading this specification, be sure you have the correct version of each page.

Revisions		Design Section			Sheet Rev. No.					
Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment	Kawakami	Murata	Hosomi	I	I	21	E	50	G
B	Change	Yamada	Kawakami	Godo	II	E	22	E	51	E
C	Change	Yamada	Godo	Godo	III	G	23	E	52	E
D	Change	Yamada	Godo	Godo	IV	E	24	E	53	E
E	Change	Yamada	--	Murata	V	E	25	E	54	E
F	Change	Yamada	--	Murata	VI	H	26	E	55	E
G	Change	Kitahara	Natori	Iino			27	E	56	E
H	Change	Kitahara	Natori	Iino			28	E	57	E
I	Change	Kitahara	Natori	Iino			29	E	58	E
					1	G	30	E	59	G
					2	G	31	E	60	E
					3	G	32	E	61	E
					4	G	33	E	62	E
					5	G	34	E	63	E
					6	G	35	E	64	E
					7	G	36	E	65	E
					8	G	37	E	66	E
					9	G	38	E	67	E
					10	G	39	E	68	G
					11	E	40	E	69	G
					12	I	41	E	70	E
					13	I	42	E	71	E
					14	F	43	E	72	E
					15	F	44	E	73	E
					16	E	45	G	74	E
					17	E	46	E	75	E
					18	E	47	E	76	G
					19	E	48	E	77	E
					20	E	49	E	78	E

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Rev.	Document	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	Enactment				79	E				
B	Change				80	E				
C	Change				81	E				
D	Change				82	E				
E	Change				83	E	App.1	E		
F	Change				84	G	App.2	E		
G	Change				85	E	App.3	E		
H	Change				86	E	App.4	E		
I	Change				87	E	App.5	E		
					88	E	App.6	E		
					89	E	App.7	E		
					90	E	App.8	E		
					91	E	App.9	E		
					92	E	App.10	E		
					93	E	App.11	E		
					94	E	App.12	E		
					95	E	App.13	E		
					96	E	App.14	H		
					97	E	App.15	H		
					98	E				
					99	E				
					100	E				
					101	E				
					102	E				
					103	E				
					104	E				
					105	E				
					106	E				
					107	E				

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	1	5	1	1	4	107	15	134

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REVISION SHEET

REV.	SHEET	CHANGED CONTENTS
A	All	Newly enacted.
B	All	All pages are revised.
	7	1.11 EMI and Safety Standards Applied Added 2) Europe.
	8	1.13 Environmental Conditions for Operating Changed Figure 1.13.1. 1.14 Ways to wear the Printer Added “2) Shoulder strap.”
	31	Table 3.6.3 Changed “RIDB” to “IEEE802.11b wireless interface communication unit.”
	46	5.2 Options Added “• Shoulder strap.”
C	All	Added Bluetooth interface model.
D	All	All pages are revised.
	3	1.6 Paper Specifications Added 6) Specified roll paper number. 10) Roll paper end treatment Added ETLB series.
	6	1.10 Electrical Characteristics 2) Battery capacity with full charge • IEEE802.11b model (Power saving mode: Disabled): Changed “Approximately 10 hours” to “Approximately 9 hours.”
	7	1.11 EMI and Safety Standards Applied Added 3) Oceania. 1.12 Reliability 1) Life: Added “Autocutter: 100,000 cuts …”
	14	2.2.4 Compatible types of installed IEEE802.11b wireless cards Changed Manufacturer, Model name, and Type number.
	App.5	Added B.2 Cleaning the Autocutter.
	App.14	APPENDIX H: PRECAUTIONS FOR USE Added “16) When exchanging the battery, make sure to turn the power off in advance.
E	All	All pages are revised.
	II	General Features Added Interface type and Character support.
	2	1.2 Character Specifications Added Japanese model and Multilingual model.
	18	Added List of Multi-byte Code Characters Commands.
	63	**ESC R** Changed [Default].
	68	**GS (C** [Notes]: Added “• If the power is turned off ….”
	73	**GS (E** [Notes]: Added “• If the power is turned off …”

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REV.	SHEET	CHANGED CONTENTS
E	84	**GS (L** [Notes]: Added "• If the power is turned off …"
	89	**GS (M** [Notes]: Added "• If the power is turned off …"
	92, 93	**GS I** [Range]: Added "n=69 [printer information B]."
	98	**GS g 0** [Notes]: Added "• If the power is turned off …"
	104 – 107	Added 6.4 Commands of Multi-byte Code Characters.
F	I	CONFIDENTIALITY AGREEMENT Added 8. to Cautions.
	14	2.2 IEEE 802.11b Wireless Interface 2.2.2 Print protocol Changed the description of the table. Added 1) LP, LPR. Added 2) Socket Communications.
	15	Moved 2.2.4 Compatible types of installed IEEE 802.11b wireless cards from Sheet 14.
G	1	1. GENERAL SPECIFICATIONS Added "1.1 Countries where the TM-P60 can be used."
	1 - 10	Shifted the section numbers 1.1 – 1.20 to 1.2 – 1.21.
	45	3.20 Memory Switches Added "• Communication conditions of the Bluetooth interface (With the Bluetooth interface model)." Added "4) Communication conditions of the Bluetooth interface (With the Bluetooth interface model)."
	50	6.2 Explanation of Terms 6) Maximum printable area (In the table) Corrected "80 mm model" to "60 mm model."
	59	<Function 48> **ESC (A** [Range] Added "*fn* = 48."
	68	**GS (C** [Notes] Added "• The number of items registered in the NV user memory must be 50 or fewer to make the boot up time of the printer short enough. The boot up time of the printer is longer by one second maximum when the number of items registered is 50."
	69	<Function 1> **GS (C** [Notes] Added "• The number of items registered in the NV user memory or NV graphics must be 50 or fewer to make the execution time of this function short enough. The execution time is 80 seconds or less when the number of items registered is 50 or fewer. • The execution time for 50 items is 80 seconds or fewer. • The execution time for 100 items is 160 seconds or fewer."

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REV.	SHEET	CHANGED CONTENTS
G	76	<Function 5> **GS (E** [Default (upon shipment)] Changed "(n_L = 5, n_H = 0)" to "(n_L = 2, n_H = 0)."
	84	**GS (L** [Notes] Added "• The number of items registered in the NV user memory or NV graphics must be 50 or fewer to make the execution time of <Function 67> **GS (L** short enough. The execution time is 80 seconds or less when the number of items registered is 50 or fewer. • The execution time for 50 items is 80 seconds or fewer. • The execution time for 100 items is 160 seconds or fewer."
H	App.14	Added "APPENDIX H: NOTES ON THE SERIAL CABLE."
	App.15	Changed "APPENDIX H: PRECAUTIONS FOR USE" to "APPENDIX I: PRECAUTIONS FOR USE" and moved from App.14.
I	I	Trademarks Changed "EPSON® and ESC/POS® are registered trademarks of Seiko Epson Corporation in the United States and other countries. " to "EPSON and ESC/POS are registered trademarks of Seiko Epson Corporation in Japan and other countries/regions."
	12, 13	2.1.3 Interface connector terminal assignments and signal functions Table 2.1.1 Signal Assignments and Functions, Table 2.1.2 Signal Assignments and Functions Pin number 9: Corrected "The cable side is connected with #10 pin." to "The cable side is connected with #11 pin and #12 pin."

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GENERAL FEATURES

1) This specification applies to the TM-P60 printer.

The following models with the combination of the interface type and the character support are available on the TM-P60.

- Interface type: (1) IEEE802.11b
  (2) Bluetooth
- Character support: (1) ANK model
  (2) Japanese model
  (3) Multilingual model

  NOTE: The multilingual model supports the following characters:
  (1) Traditional Chinese

  * The IEEE802.11b interface is available with the ANK model or the Japanese models.

* This specification describes only the outline of the general functions and the model-dependent functions of the commands. For detailed specifications and usage of the commands, please see the ESC/POS APG (Application Programming Guide) that is separately issued.

2) Features

The TM-P60 printer has the following features:

- Maximum printing speed of 70 mm/s is possible.
- 58 mm paper width can be used. 60 mm paper width can be used by removing the spacer.
- The belt clip is standard. Horizontal installation is also possible.
- Paper loading is easy by putting in the roll paper.
- The autocutter is standard.
- Has a wireless interface (IEEE802.11b compliance or Bluetooth) and a serial interface.
- Long term use is possible by using the battery.
- The command system complies with ESC/POS.
- OPOS ADK and Windows drivers are available.
- Printing various kinds of barcodes is possible.
- Various formats are possible using the page mode.

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1. GENERAL SPECIFICATIONS

1.1 Countries and areas where the TM-P60 can be used

Each model of the TM-P60 can only be used in the countries and areas listed below.

Model	Countries
001	Japan
011	USA, Canada
021	Austria, Belgium, Germany, Luxembourg, Netherlands, Switzerland, France, Italy, Greece, Spain, Portugal, Denmark, Finland, Ireland, Sweden, UK
	Only the products with serial numbers of GDYG003018 onward can be used in the following 9 countries. Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia, Slovak Republic, Norway
031	Australia, New Zealand
051	Thailand, Malaysia
501	Japan
511	USA, Canada
521	Austria, Belgium, Germany, Luxembourg, Netherlands, Switzerland, France, Italy, Greece, Spain, Portugal, Denmark, Finland, Ireland, Sweden, UK, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia, Slovak Republic, Norway
531	Australia, New Zealand
541	Hong Kong
551	Thailand, Malaysia

1.2 Print Specifications

1) Print method: Thermal line printing

2) Dot density: 8 dots/mm × 8 dots/mm (203 dpi × 203 dpi)
[dpi: dots per 25.4 mm {1"}]

3) Feed direction: Unidirectional forward with friction feed

4) Paper width: 58 mm {2.28"} (default setting) or 60 mm {2.36"}
60 mm {2.36"} paper width can be set by removing the roll paper spacer installed in the printer.

5) Print width: 52.5 mm {2.07"}, 420 dot positions (when the paper width is 58 mm)
54 mm {2.13"}, 432 dot positions (when the paper width is 60 mm)

6) Number of characters per line:

	Font A	Font B	Font C
58 mm {2.28"}	35	42	52
60 mm {2.36"}	36	43	54

7) Print speed: 70 mm/s {2.76"} maximum
(When total number of dots to be printed is 64 dots or less per line)

NOTES: 1. The print speed listed above is the value when the print density is set to 100% with the battery fully charged at 25°C {77°F}. The print speed may change automatically depending on the power supply voltage and the condition of the head temperature.

2. Printing speed may be slower, depending on the data transmission speed and the combination of control commands.

8) Paper feed speed 70 mm/s {2.76"/s}

9) Line spacing: 3.75 mm {0.15"} (default setting)
(Programmable by control command.)

1.3 Character Specifications

1) Number of characters:

Alphanumeric characters:	95
Extended graphics:	128 × 10 pages
Space page:	128 × 1 page
International characters:	48

• Japanese model: JIS (JIS X0208-1990): 6879
Special font:

Code System	Number of Characters	JIS Code	Shift JIS Code
Special	845	2D-21 ~ 2D-7E 79-21 ~ 7C-7E	87-40 ~ 87-9D ED-40 ~ EE-FC FA-40 ~ FC-4E

See “Character Code Table (for Japanese font)” for details.

• Multilingual model: Traditional Chinese (Big 5): 13535

2) Character structure: Font A (12 × 24)
Font B (10 × 24) (default)
Font C (8 × 16)

3) Character size (character area):

Table 1.2.1 Character Size

		W × H (mm)
Font A	12 × 24	1.50 × 3.0
Font B	10 × 24	1.25 × 3.0
Font C	8 × 16	1.0 × 2.0

NOTE: The actual print character may be smaller than the size shown in the table above, because the above size includes spaces in the font.

1.4 Autocutter

1) Cutting method: By separated-blade scissor

2) Cutting type: One point left uncut

1.5 Manual Cutter

The manual cutter is used when the roll paper is loaded. This cutter does not have equal durability in normal usage.

1.6 Roll paper Supply Device

1) Supply method: Drop-in roll paper

2) Paper width selection: 58 mm {2.28"} or 60 mm {2.36"} is selectable with or without the roll paper spacer. The spacer setting is the default setting.

NOTES: 1. Be sure to set the paper width with the memory switch to adjust printing to the print width.

2. Never change the paper width from 58 mm {2.28"} to 60 mm {2.36"} once you have set the paper width to narrow.

1.7 Paper Specifications

1) Paper type: Specified thermal paper

2) Paper thickness: 50 μm to 80 μm

3) Paper width: 58 mm paper width model: 57.5 ± 0.5 mm {2.26 ± 0.02"}
60 mm paper width model: 59.5 ± 0.5 mm {2.34 ± 0.02"}

4) Form: Roll paper

5) Roll paper size:
Roll diameter: Maximum 51 mm {2.01"}
Roll paper width: For 58 mm: 58 mm +0/–1.0 mm
For 60 mm: 60 mm +0/–1.0 mm

6) Specified roll paper number

Paper type	Paper width (width of the liner)		Remarks
	58 mm	60 mm	
Continuous label paper	--	ETLB060050000	

7) Specified original paper type no.:

The following original paper can be used for receipts:

TF50KS-E (paper thickness: 65 μm) (NIPPON Paper Industries Co.,Ltd.)

- U.S.A.:
  - P350 (paper thickness: 62 μm) Kanzaki Specialty Paper (USA)
  - P310 (paper thickness: 58 μm) Kanzaki Specialty Paper (USA)
  - P300 (paper thickness: 56 μm) Kanzaki Specialty Paper (USA)

8) Roll paper spool outside diameter

18 mm {0.71"} or more

NOTE: Paper must not be pasted to the roll paper spool.

9) Arrangement of the roll paper end

A red line that indicates the paper end (its length is decided by users) is recommended to be preprinted on the end of the roll paper.

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10) Roll paper end treatment
For best print quality and reliability, select the proper print density for the paper type used. See the table below. Print density can be set with a memory switch.

Roll paper No.	Original Paper No.	Density Level
	P350	90%
	P300, P310	95%
	TF50KS-E	100%
ETLB series	--	130%

1.8 Printable Area

1) Thermal paper

Example:

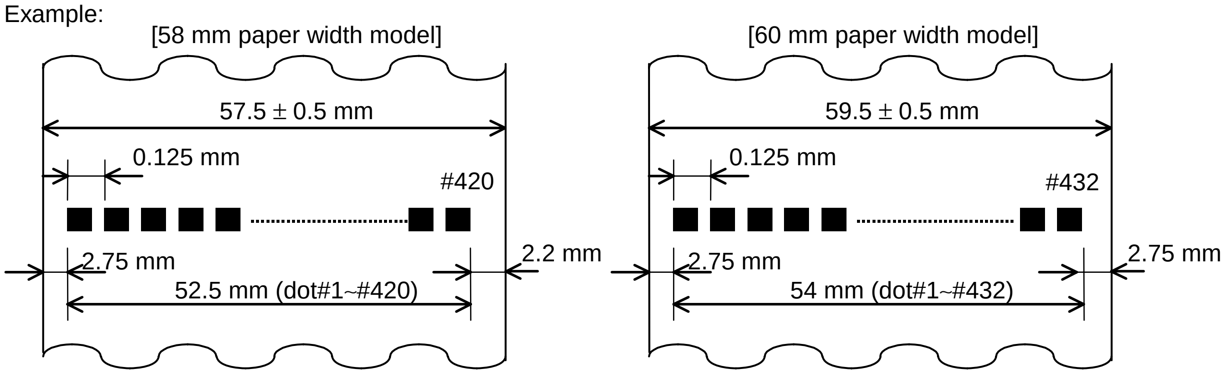


Figure 1.7.1 Printable Area (for Thermal Paper)

Table 1.7.1 Paper Width and Printable Area

Paper width (mm)	58	60
Printable area (mm)	52.5	54
Left margin (mm)	2.75	2.75
Right margin (mm)	2.2	2.75
Positioning dot umber	1 ~ 420	1 ~ 432
Total number of dots	420	432
Font A	35	36
Font B	42	43
Font C	52	54

(Numeric values used here are average values for designing. Only the paper width dimension is exact. The values in parentheses are the maximum value for the paper tolerance.)

1.9 Printing and Cutting Positions

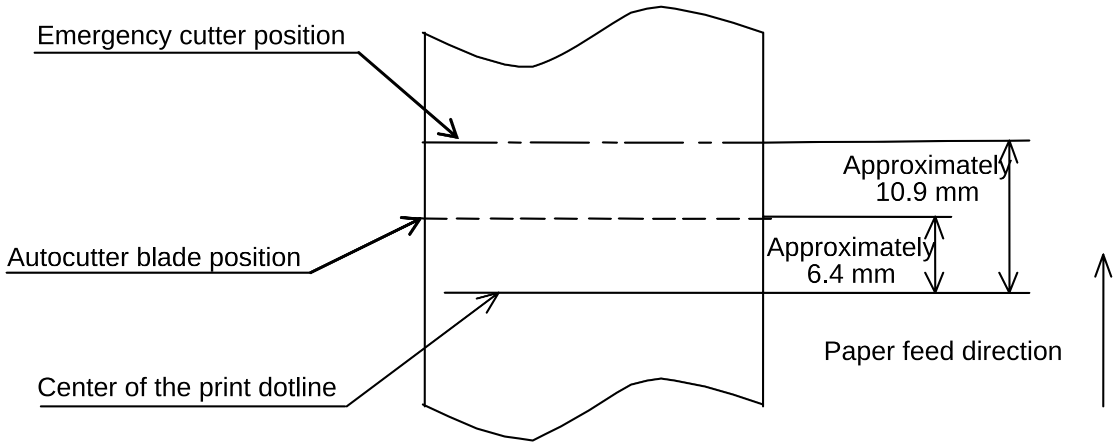


Figure 1.8.1 Printing and Cutting Positions

NOTE: Numeric values used here are typical values; the values may vary slightly as a result of paper slack or variations in the paper. Take this into account when setting the cutting position of the autocutter.

Paper feeding (approx. 1 mm) is performed automatically before printing for the first time after-autocutting in order to prevent character deformation. Because of that, be aware that there is approximately 1 mm space added to the 7 mm after the autocutting point when continuous printing is performed.

1.10 Internal Buffer

1) Receive buffer: 128 bytes
2) NV area: 384 KB
   The NV area is the memory area both for the NV graphics and the NV user memory.
3) Page mode area: Approximately 63 KB

1.11 Electrical Characteristics

1) Power supply

(1) AC adapter	PS-10 (option)	
	Rated voltage:	12 VDC
	Input voltage:	100 VAC to 240 VAC
(2) Battery	Lithium-ion battery LIP-2500 (packaged and option)	
	Output:	7.4 VDC
	Capacity:	2200 mAh

Do not unplug or plug in the AC adapter (PS-10) during printing.

2) Battery capacity with full charge

- IEEE802.11b model (Power saving mode: Disabled): Approximately 9 hours
- IEEE802.11b model (Power saving mode: Enabled): Approximately 12 hours
- Bluetooth model: Approximately 20 hours

Epson has confirmed that the battery can work for approximately 10 hours under the following test conditions:

(1) Battery: Brand - new
(2) Charging state: Charged fully
(3) Saving mode of IEEE 802.11b wireless interface: disabled
(4) Print pattern: ANK 42 columns × 20 lines printing + 6 lines feeding + autocutting
(5) Interval of printing: Once per 2.5 minutes
(6) Environment: Room temperature
(7) Print density: 100%
(8) Access point: Symbol 4131 (only for IEEE802.11b)

- The battery working time as mentioned above differs depending on the environmental conditions.

1.12 EMI and Safety Standards Applied

1) North America — EMI: FCC/ICES-003 Class B
Safety standards: UL60950/CSA C22.2 No. 60950

UL's Conditions of Acceptability

1. The Investigated Pollution Degree is 2.
2. This Unit is Intended to be supplied by LPS only.

2) Europe — CE marking Directive: 1999/5/EC

- EN300 328-2
- EN60950
- EN301 489-1
- EN301 489-17
  - EN55022 Class B
  - EN61000-3-2
  - EN61000-3-3
  - EN55024
    - IEC61000-4-2
    - IEC61000-4-3
    - IEC61000-4-4
    - IEC61000-4-5
    - IEC61000-4-6
    - IEC61000-4-11

Safety Standard: EN60950

3) Oceania — AS/NZS 4771 (EN300328)
AS/NZS CISPR22 Class B

1.13 Reliability

1) Life:

Printer mechanism (including the thermal head life)

Line printed: 10,000,000 lines printed (3.75 mm {0.15"} for one line)
(When the value above is calculated, the printer uses 26-line feeding and 20-line printing repeatedly with a 80 µm paper thickness. The value above corresponds to approximately 50 km {31.08 miles} of running length.)

Thermal head (for one element):
100 million pulses

Autocutter: 500,000 cuts (when the paper thickness is less than 50 to 80 µm)
100,000 cuts (when a continuous label is issued. 200,000 cuts with autocutter cleaning)

NOTE: End of life is defined as the point at which the component reaches the beginning of the wearout period.

2) MTBF: 120,000 hours
(Failure is defined as a random failure occurring during the random failure period.)

3) MCBF: 16,000,000 lines printed
(This is an average failure interval based on failures relating to wearout and random failures up to the life of 10,000,000 lines printed.)

1.14 Environmental Conditions for Operating

1) Operating: <Power supply: Battery>

Temperature: 0 to 50°C {32 to 122°F} (except for print quality)
Humidity: 10 to 90% RH (except for paper)

<Power supply: AC adapter>

Temperature: 0 to 45°C {32 to 113°F} (except for print quality)
Humidity: 10 to 90% RH (except for paper)

NOTE: The temperature above applies only if power management is enabled.
When power management is disabled, the highest temperature is 40°C.

2) Print quality to be guaranteed:
Temperature: 5 to 45°C {41 to 113°F}
Humidity: 10 to 90% RH

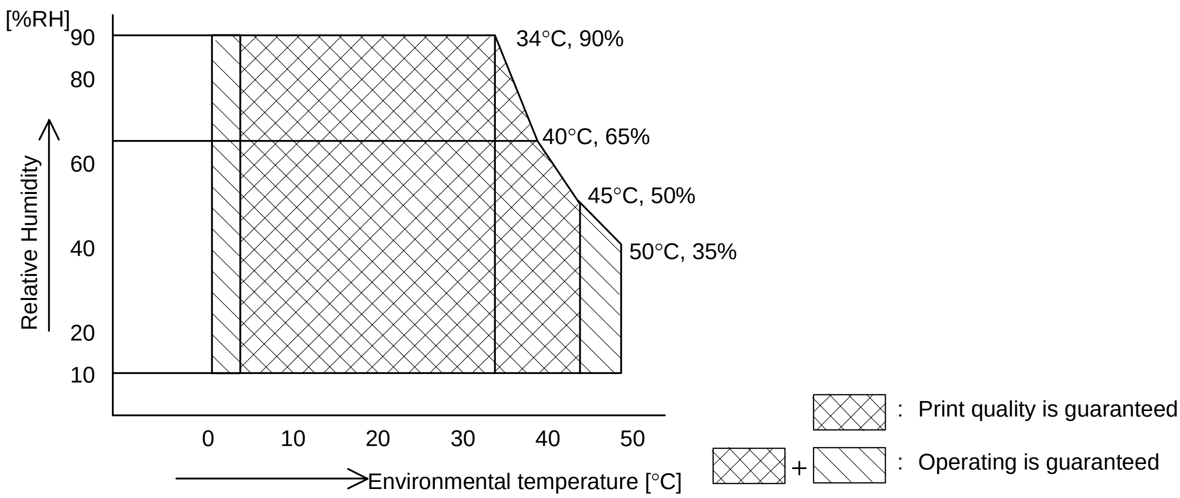


Figure 1.13.1 Temperature and Humidity Range for Operating to be Guaranteed

3) Battery charging: Temperature: 0 to 40°C {32 to 104°F}
Humidity: 10 to 90% RH

1.15 Ways to wear the Printer

1) Belt clip
2) Shoulder strap (option)

1.16 Installation Angle

1) Vertical placement (The roll paper side is down.)

2) Horizontal placement (The printer is assumed to be placed on a table.)

1.17 Environmental Conditions for Storage

1) Storage at high temperatures and high humidity:

	Temperature:	50°C {122°F}
	Humidity:	90% RH
	Total time:	120 hours

EPSON has confirmed that no unexpected conditions will occur in operation of the mechanism at 25°C {77°F}, 60% RH after being left for two hours past storage in the above conditions.

2) Storage at high temperatures:	Temperature:	70°C {158°F}
	Total time:	120 hours

EPSON has confirmed that no unexpected conditions will occur in operation of the mechanism at 25°C {77°F}, 60% RH after being left for two hours past storage in the above conditions.

3) Storage at low temperatures:	Temperature:	-25°C {-13°F}
	Total time:	120 hours

EPSON has confirmed that no unexpected conditions will occur in operation of the mechanism at 25°C {77°F}, 60% RH after being left for two hours past storage in the above conditions.

1.18 Vibration Resistance

1) When packed:

Frequency:	5 to 55 Hz
Acceleration:	Approximately 19.6 m/s^2 {2 G}
Sweep:	10 minutes (half cycle)
Duration:	1 hour
Directions:	x, y, and z

EPSON has confirmed that no external or internal damage should be found after the vibration test, and the unit should operate normally.

1.19 Impact Resistance

1) Drop test when unpacked

Height:	120 cm {3.94'}
Type of floor:	Concrete
Directions:	6 surfaces, 6 edges, and 2 corners
Times dropped:	One time for each direction

EPSON has confirmed that no external or internal damage should be found after the drop test when the printer is not printing.

2) Drop test when packed

Package type:	Epson standard packing
Height:	60 cm {1.97'}
Directions:	1 corner, 3 edges, and 6 surfaces

EPSON has confirmed that the unit should operate normally after the drop test.

1.20 Battery Charging

1) Environmental conditions

0 to 40°C {32 to 104°F}

2) Charging method and period

The battery can be charged by the printer itself or the rapid battery charger OT-CH60 (option).

(1) Charging by the printer itself

The battery is charged through the battery charging circuit inside the printer when the AC adaptor PS-10 is connected to the printer.

The battery is charged only when the printer's power is off.

Charging period: Approximately 4 hours (new battery, room temperature)

Charging period is the period that becomes charged fully from the level L of the battery remaining state.

(2) Charging by the rapid battery charger

The battery is charged by the rapid battery charger OT-CH60 (option) when the battery is inserted into this battery charger.

Charging period: Approximately 2.5 hours (new battery, room temperature)

Charging period is the period that becomes charged fully from the level L of the battery remaining state.

1.21 Acoustic Noise

Operating: Approximately 53 dB (ANSI bystander position)

NOTE: The value as shown above is measured when the EPSON evaluation printing pattern is used. This value may be different, depending on the paper to be printed, the print duty, or the print conditions, such as the print speed or the print density.

2. INTERFACE

The printer has 2 interfaces, the serial interface and the wireless interface.

The wireless interface supports either of two-types – IEEE802.11b or Bluetooth.

When the printer is connected with the RS-232 serial cable and the power is turned on, communication by the RS-232 serial interface is enabled, and communication by the wireless interface is disabled at that time.

When the printer is not connected with the RS-232 serial cable and the power is turned on, communication by the wireless interface is enabled, and communication by the RS-232 serial interface is disabled.

2.1 RS-232 Serial Interface

2.1.1 Specifications (RS-232 compliant)

Data transmission:	Serial	
Synchronization:	Asynchronous (asynchronous)	
Handshaking:	DTR/DSR or RTS/CTS control Selectable with DIP SW	
Signal levels:	MARK = -3 to -15 V: SPACE = +3 to +15 V:	Logic "1"/ OFF Logic "0"/ ON
Communication speed:	9600, 19200, 38400 bps (bps: bits per second)	
Data word lengths:	8 bits	
Parity settings:	None, even, odd	
Stop bits:	1 bit or more	

NOTES: 1. The communication speed and parity depend on the memory switch settings.
2. The stop bit of transmission data from the printer side is fixed to 1.

2.1.2 Serial interface connector

Printer side: RL01-R12P-E1000 (JAE)

Use specified RS-232 cable (type: OT-RS60).



2.1.3 Interface connector terminal assignments and signal functions

The signals of the connector #4 and #7 change with DIP SW selection.

(1) When DTR/DSR control is selected

Table 2.1.1 Signal Assignments and Functions

Pin number	Signal name	Signal direction	Function
1	FG	—	Frame ground
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	DTR	Output	This signal indicates whether the printer is busy. SPACE indicates that the printer is ready to receive data, and MARK indicates that the printer is busy.
5	CTS	Input	Not used.
6	DSR	Input	This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data, and MARK indicates that the host computer cannot receive data.
7	RTS	Output	Same as #4 signal
8	NC	—	Not used.
9	CIFC	Input	Connection or disconnection of RS-232 cable with the printer is confirmed. The cable side is connected with #11 pin and #12 pin.
10	SG	—	Signal ground
11	SG	—	Signal ground
12	SG	—	Signal ground

(2) When RTS/CTS control is selected

Table 2.1.2 Signal Assignments and Functions

Pin number	Signal name	Signal direction	Function
1	FG	—	Frame ground
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	DTR	Output	Same as #7 signal
5	CTS	Input	This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data, and MARK indicates that the host computer cannot receive data.
6	DSR	Input	Not used.
7	RTS	Output	This signal indicates whether the printer is busy. SPACE indicates that the printer is ready to receive data, and MARK indicates that the printer is busy.
8	NC	—	Not used.
9	CIFC	Input	Connection or disconnection of RS-232 cable with the printer is confirmed. The cable side is connected with #11 pin and #12 pin.
10	SG	—	Signal ground
11	SG	—	Signal ground
12	SG	—	Signal ground

2.2 IEEE 802.11b Wireless Interface

2.2.1 Specifications (IEEE 802.11b compliant)

- IEEE 802.11b (2.4 GHz zone) compliant wireless LAN communication is supported.
- Infrastructure mode and 802.11 Ad-hoc mode are supported.
- Communication speed can be fixed or automatically changed to 11 Mbps, 5.5 Mbps, 2 Mbps, or 1Mbps.
- 64 bit/128 bit WEP (encryption) compliant. 4 types of WEP key are selectable.
- Energy-saving mode is selectable.
- Automatic allocation function (DHCP, APIPA)

NOTE: The wireless communication may not be connected depending on the combination with the access point. To select the access point, see the technical reference guide for details.

2.2.2 Print protocol

Print job is output via following protocols to the printer.

Protocol	Application
LP, LPR	Transfers printing data.
TCP Socket Port	Transfers printing data and printer status by direct socket communications (bi-directional).

1) LP, LPR

- Maximum Simultaneous Connections: 3
- Number of connections that can print: 1 (Other users are kept waiting until this printing is completed.)
- Time Out: 5 minutes
- Job deletion: not supported
- Banner printing: not supported

2) Socket Communications

- Port type: TCP comm. port for direct printing
- Port number: 9100
- Port communication direction: bi-directional
- Maximum Simultaneous Connections: 3
- Number of connections that can print: 1 (Other users are kept waiting until this printing is completed.)
- Time Out: 5 minutes

2.2.3 Setting/monitoring function

- Setting of wireless and network parameters using WWW browsers and display of operating states
- Setting of wireless and network parameters using the dedicated utility, and display of operating states
- Automatic IP address acquisition function (DHCP, APIPA) is supported.
- IP address setting with arp + ping

2.2.4 Compatible types of installed IEEE 802.11b wireless cards

Manufacturer:	TOYOTA INDUSTRIES CORPORATION
Model name:	WIRELESS LAN CF-CARD
Type number:	6180210

2.3 Bluetooth Wireless Interface

2.3.1 Specifications

- Bluetooth Specification Version 1.1 compliant
- Serial Port Profile (SPP) is supported.
- Bluetooth Power Class 2
- An antenna is built-in.
- Passkey can be set.
- A device name can be set.

2.3.2 Notes on using the Bluetooth wireless interface

- About time to start printing

  If the host and the printer are connected on a case-by-case basis (not connected on a continuous basis), it may take same time after the host indicates printing before printing starts.
  This is caused by that the connection process time is necessary between the host and the printer.
  This time differs depending on the environmental conditions.

- About timing to shut the connection off

  Even when the host completes data sending to the printer, the print data may remain in the print buffer of the printer. If the connection between the host and the printer is disconnected, the data in the print buffer may be discarded.
  Therefore, when the printing is executed or the wireless connection is disconnected, be sure to confirm whether the sending data has been printed completely, by checking the status or other method.

2.4 Receive Buffer

128 bytes

- The receive buffer-full state refers to the period from when the remaining space becomes 68 bytes to when it increases to 109 bytes.
- The printer ignores the data received when the remaining space in the receive buffer is 0 bytes.

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3. FUNCTIONS

3.1 List of Commands

Command	Name
HT	Horizontal tab
LF	Print and line feed
FF	Print and return to standard mode (in page mode)
CAN	Cancel print data in page mode
DLE EOT	Transmit real-time status
DLE ENQ	Send real-time request to printer
DLE DC4	Execute power-off sequence (*fn* = 2)
	Transmit specified status in real-time (*fn* = 7)
	Clear buffer(s) (*fn* = 8)
ESC FF	Print data in page mode
ESC SP	Set right-side character spacing
ESC $	Set absolute print position
ESC (A	Control beeper tones <Function 48> Beeps the buzzer.
ESC –	Turn underline mode on/off
ESC 3	Set line spacing
ESC =	Select peripheral device
ESC @	Initialize printer
ESC D	Set horizontal tab positions
ESC E	Turn emphasized mode on/off
ESC J	Print and feed paper
ESC L	Select page mode
ESC M	Select character font
ESC R	Select an international character set
ESC S	Select standard mode
ESC T	Select print direction in page mode
ESC W	Set print area in page mode
**ESC **	Set relative print position
ESC a	Select justification
ESC c 5	Enable/disable panel buttons
ESC d	Print and feed *n* lines
ESC t	Select character code table
ESC {	Turn upside-down print mode on/off
GS !	Select character size
GS $	Set absolute vertical print position in page mode

Command	Name
GS (C	Edit NV user memory <Function 0> Delete the specified record. <Function 1> Store the data in the specified record. <Function 2> Transmit the data in the specified record. <Function 3> Transmit capacity of the NV user memory currently being used. <Function 4> Transmit the remaining capacity of the NV user memory. <Function 5> Transmit the key code list. <Function 6> Delete all data in the NV user memory.
GS (D	Enable/disable real-time command
GS (E	Set user setup commands <Function 1> Change into the user setting mode. <Function 2> End the user setting mode session. <Function 3> Change the settings of the memory switch. <Function 4> Transmit the settings of the memory switch. <Function 5> Set the customized setting values. <Function 6> Transmit the customized setting values. <Function 7> Copy the user-defined page. <Function 9> Define the data (raster format) for the character code page. <Function 10> Delete the data for the character code page. <Function 11> Set the configuration item for the serial interface. <Function 12> Transmit the configuration item for the serial interface. <Function 13> Set the configuration item for the Bluetooth interface. <Function 14> Transmit the configuration item for the Bluetooth interface.
GS (H	Request transmission of response <Function 48> Set the process ID response.
GS (K	Select print control method(s) <Function 48> Select the print control mode.
GS (L	Set graphics data <Function 48> Transmit the NV graphics memory capacity. <Function 50> Print the graphics data in the print buffer. <Function 51> Transmit the remaining capacity of the NV graphics memory. <Function 64> Transmit the key code list for defined NV graphics. <Function 65> Delete all NV graphics data. <Function 66> Delete the specified NV graphics data. <Function 67> Define the NV graphics data (raster format). <Function 69> Print the specified NV graphics data. <Function 112> Store the graphics data in the print buffer (raster format).
GS (M	Customize printer control value(s) <Function 1> Save the setting values from the work area into the storage area. <Function 2> Load the setting values stored in the storage area to the work area. <Function 3> Select the setting values loaded to the work area after the initialization process.
GS B	Turn white/black reverse print mode on/off
GS H	Select print position of HRI characters
GS I	Transmit printer ID
GS L	Set left margin

Command	Name
GS V	Select cut mode and cut paper
GS W	Set print area width
**GS **	Set relative vertical print position in page mode
GS a	Enable/disable Automatic Status Back (ASB)
GS b	Turn smoothing mode on/off
GS f	Select font for HRI characters
GS g 0	Initialize maintenance counter
GS g 2	Transmit maintenance counter
GS h	Set bar code height
GS k	Print bar code
GS r	Transmit status
GS w	Set bar code width

List of Multi-byte Code Characters Commands (for Japanese model and Traditional Chinese model)

Command	Name
FS !	Select print mode(s) for Kanji characters
FS &	Select Kanji character mode
FS (A	Select Kanji character style(s) <Function 48> Select Kanji character font.
FS –	Turn underline mode on / off for Kanji characters
FS .	Cancel Kanji character mode
FS 2	Define user-defined Kanji characters
FS C	Select Kanji character code system
FS S	Set Kanji character spacing
FS W	Turn quadruple-size mode on / off for Kanji characters

NOTE: **FS (A** and **FS C** are supported only in Japanese model.

3.2 Character Code Tables

- The character code tables show only character configurations. They do not show the actual print pattern.
- "SP" in the table shows space.

3.2.1 Common to all pages (International Character Set: USA)

HEX	0	1	2	3	4	5	6	7
0	NUL 00	DLE 16	SP 32	0 48	@ 64	P 80	` 96	p 112
1	01	XON 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	02	18	" 34	2 50	B 66	R 82	b 98	r 114
3	03	XOFF 19	# 35	3 51	C 67	S 83	c 99	s 115
4	EOT 04	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	ENQ 05	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117
6	ACK 06	22	& 38	6 54	F 70	V 86	f 102	v 118
7	07	23	' 39	7 55	G 71	W 87	g 103	w 119
8	08	CAN 24	(40	8 56	H 72	X 88	h 104	x 120
9	HT 09	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	| 124
D	CR 13	GS 29	– 45	= 61	M 77	] 93	m 109	} 125
E	14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	15	31	/ 47	? 63	O 79	_ 95	o 111	SP 127

3.2.2 Page 0 [PC437: USA, Standard Europe]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	^{n} 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	Φ 237	^{2} 253
E	Ä 142	Pt 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.2.3 Page 1 [Katakana]

HEX	8	9	A	B	C	D	E	F
0	_ 128	┴ 144	SP 160	ｰ 176	ﾀ 192	ﾐ 208	═ 224	╳ 240
1	▁ 129	┬ 145	｡ 161	ｱ 177	ﾁ 193	ﾑ 209	╞ 225	円 241
2	▂ 130	┤ 146	｢ 162	ｲ 178	ﾂ 194	ﾒ 210	╪ 226	年 242
3	▃ 131	├ 147	｣ 163	ｳ 179	ﾃ 195	ﾓ 211	╡ 227	月 243
4	▄ 132	▔ 148	､ 164	ｴ 180	ﾄ 196	ﾔ 212	◢ 228	日 244
5	▅ 133	─ 149	･ 165	ｵ 181	ﾅ 197	ﾕ 213	◣ 229	時 245
6	▆ 134	│ 150	ｦ 166	ｶ 182	ﾆ 198	ﾖ 214	◥ 230	分 246
7	▇ 135	▕ 151	ｧ 167	ｷ 183	ﾇ 199	ﾗ 215	◤ 231	秒 247
8	▏ 136	┌ 152	ｨ 168	ｸ 184	ﾈ 200	ﾘ 216	♠ 232	〒 248
9	▎ 137	┐ 153	ｩ 169	ｹ 185	ﾉ 201	ﾙ 217	♥ 233	市 249
A	▍ 138	└ 154	ｪ 170	ｺ 186	ﾊ 202	ﾚ 218	♦ 234	区 250
B	▌ 139	┘ 155	ｫ 171	ｻ 187	ﾋ 203	ﾛ 219	♣ 235	町 251
C	▋ 140	╭ 156	ｬ 172	ｼ 188	ﾌ 204	ﾜ 220	● 236	村 252
D	▊ 141	╮ 157	ｭ 173	ｽ 189	ﾍ 205	ﾝ 221	○ 237	人 253
E	▉ 142	╰ 158	ｮ 174	ｾ 190	ﾎ 206	ﾞ 222	╱ 238	▓ 254
F	┼ 143	╯ 159	ｯ 175	ｿ 191	ﾏ 207	ﾟ 223	╲ 239	SP 255

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3.2.4 Page 2 [PC850: Multilingual]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	ð 208	Ó 224	– 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Đ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

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3.2.5 Page 3 [PC860: Portuguese]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	À 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	È 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	Ê 137	Õ 153	Ò 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Í 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	^{n} 252
D	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▌ 221	Φ 237	^{2} 253
E	Ã 142	Pt 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

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3.2.6 Page 4 [PC863: Canadian-French]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	¦ 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Ê 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	¶ 134	û 150	^{3} 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	^{n} 252
D	‗ 141	Ù 157	¾ 173	╜ 189	═ 205	▌ 221	Φ 237	^{2} 253
E	À 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

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3.2.7 Page 5 [PC865: Nordic]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	^{n} 252
D	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	Φ 237	^{2} 253
E	Ä 142	Pt 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▀ 223	∩ 239	SP 255

3.2.8 Page 16 [WPC1252]

HEX	8	9	A	B	C	D	E	F
0	€ 128	SP 144	SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	SP 129	‘ 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	‚ 130	’ 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	ƒ 131	“ 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	„ 132	” 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	… 133	• 149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	† 134	– 150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	‡ 135	— 151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	ˆ 136	˜ 152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	‰ 137	™ 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	Š 138	š 154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	‹ 139	› 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	SP 141	SP 157	- 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	Ž 142	ž 158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	SP 143	Ÿ 159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

3.2.9 Page 17 [PC866: Cyrillic #2]

HEX	8	9	A	B	C	D	E	F
0	А 128	Р 144	а 160	░ 176	└ 192	╨ 208	р 224	Ё 240
1	Б 129	С 145	б 161	▒ 177	┴ 193	╤ 209	с 225	ё 241
2	В 130	Т 146	в 162	▓ 178	┬ 194	╥ 210	т 226	Є 242
3	Г 131	У 147	г 163	│ 179	├ 195	╙ 211	у 227	є 243
4	Д 132	Ф 148	д 164	┤ 180	─ 196	╘ 212	ф 228	Ї 244
5	Е 133	Х 149	е 165	╡ 181	┼ 197	╒ 213	х 229	ї 245
6	Ж 134	Ц 150	ж 166	╢ 182	╞ 198	╓ 214	ц 230	Ў 246
7	З 135	Ч 151	з 167	╖ 183	╟ 199	╫ 215	ч 231	ў 247
8	И 136	Ш 152	и 168	╕ 184	╚ 200	╪ 216	ш 232	° 248
9	Й 137	Щ 153	й 169	╣ 185	╔ 201	┘ 217	щ 233	• 249
A	К 138	Ъ 154	к 170	║ 186	╩ 202	┌ 218	ъ 234	· 250
B	Л 139	Ы 155	л 171	╗ 187	╦ 203	█ 219	ы 235	√ 251
C	М 140	Ь 156	м 172	╝ 188	╠ 204	▄ 220	ь 236	№ 252
D	Н 141	Э 157	н 173	╜ 189	═ 205	▌ 221	э 237	¤ 253
E	О 142	Ю 158	о 174	╛ 190	╬ 206	▐ 222	ю 238	■ 254
F	П 143	Я 159	п 175	┐ 191	╧ 207	▀ 223	я 239	SP 255

3.2.10 Page 18 [PC852: Latin2]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	đ 208	Ó 224	- 240
1	ü 129	Ĺ 145	í 161	▒ 177	┴ 193	Đ 209	β 225	˝ 241
2	é 130	ĺ 146	ó 162	▓ 178	┬ 194	Ď 210	Ô 226	˛ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ń 227	ˇ 243
4	ä 132	ö 148	Ą 164	┤ 180	─ 196	ď 212	ń 228	˘ 244
5	ů 133	Ľ 149	ą 165	Á 181	┼ 197	Ň 213	ň 229	§ 245
6	ć 134	ľ 150	Ž 166	Â 182	Ă 198	Í 214	Š 230	÷ 246
7	ç 135	Ś 151	ž 167	Ě 183	ă 199	Î 215	š 231	¸ 247
8	ł 136	ś 152	Ę 168	Ş 184	╚ 200	ě 216	Ŕ 232	° 248
9	ë 137	Ö 153	ę 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	Ő 138	Ü 154	SP 170	║ 186	╩ 202	┌ 218	ŕ 234	• 250
B	ő 139	Ť 155	ź 171	╗ 187	╦ 203	█ 219	Ű 235	ű 251
C	î 140	ť 156	Č 172	╝ 188	╠ 204	▄ 220	ý 236	Ř 252
D	Ź 141	Ł 157	ş 173	Ż 189	═ 205	Ţ 221	Ý 237	ř 253
E	Ä 142	× 158	« 174	ż 190	╬ 206	Ů 222	ţ 238	■ 254
F	Ć 143	č 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

3.2.11 Page 19 [PC858: Euro]

HEX	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	ð 208	Ó 224	– 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

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3.2.12 Page 255 [User-defined page]

HEX	8	9	A	B	C	D	E	F
0	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

3.2.13 International Character Sets

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	@	[	\	]	^	`	{			}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
U.K.	£	$	@	[	\	]	^	`	{			}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{			}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{			}	~
Slovenia/ Croatia	#	$	Ž	Š	Đ	Ć	Č	ž	š	đ	ć	č
China	#	¥	@	[	\	]	^	`	{			}	~

3.3 Print Buffer-full Printing

1) In standard mode

When subsequent data is received after the printer processes one line of data in the print buffer, the printer prints the processed line and automatically feeds the paper one line.

2) In page mode

When subsequent data is received after the printer processes one line of data in the print buffer, the printer prints the processed line and automatically sets the print starting position to the next line.

3.4 Conditions for BUSY

When the printer becomes BUSY, the causes may be any the following conditions:

- During the period from when the power is turned on to when operation mode becomes definite and the printer is ready to receive data.
- When the receive buffer becomes full.
- During the power-off sequence.
- During autocutting.
- When the receiving method switches between usual receiving and receiving by DMA transfer (when a graphic command is used).

3.5 Conditions for Offline

When the printer goes offline, the causes may be any of the following:

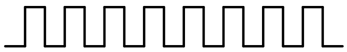
- During the period from when the power is turned on to when operation mode becomes definite and the printer is ready to receive data.
- During manual feeding.
- When the roll paper cover is open.
- When the roll paper has ended.
- When an error has occurred (unrecoverable, recoverable, automatically recoverable).
- During the power-off sequence.
- When using battery power and level S remaining battery charge is detected (battery is low). See 3.8 (3) for more information about remaining battery power.

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3.6 Error Processing

1) Errors that recover automatically

Table 3.6.1 Automatically Recoverable Errors

Error	Description	ERROR LED Flashing Pattern (→||← Approximately 320 ms)	Recovery Conditions
High temperature error	The inner temperature of the printer is extremely high.		Recovers automatically when the inner temperature of the printer cools.

NOTE: When printing patterns whose print duty is heavy continuously, or when printing patterns whose print duty is heavy when the temperature is high, the print head gets too hot and an error occurs. However, this is not abnormal.

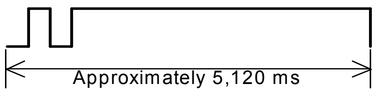
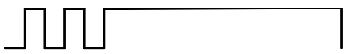
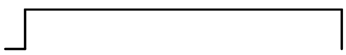
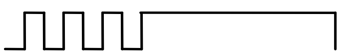
2) Errors that can be recovered

Table 3.6.2 Errors That Can Possibly Recover

Error	Description	ERROR LED Flashing Pattern (→||← Approximately 320 ms)	Recovery Conditions
Autocutter error	The autocutter does not work correctly.		Recovers by sending **DLE ENQ 2**

3) Unrecoverable errors

Table 3.6.3 Unrecoverable Errors

Error	Description	ERROR LED Flashing Pattern (→||← Approximately 320 ms)	Recovery Conditions
Software error	The software is unstable.		Impossible to recover.
Memory error	Access error of RAM and ROM.		Impossible to recover.
Voltage error	The power supply voltage is extremely high or low.		Impossible to recover
Circuit connection error	Drive circuits are abnormal.		Impossible to recover
Wireless communication unit error	Wireless interface communication unit is abnormal.		Impossible to recover
Overload error	· Temperature of thermal head is abnormally high. · Temperature of IEEE802.11b wireless interface communication unit is abnormally high.		Impossible to recover

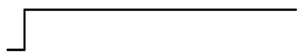
NOTE: When any error shown above occurs, turn off the power as soon as possible.

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4) Battery charging error

The ERROR LED lights up when an error is detected during battery charging.

Table 3.6.4   Battery Charging Error

Error	Description	ERROR LED Flashing Pattern	Recovery Conditions
Battery charging error	(1) Battery voltage does not reach the prescribed voltage. (2) Battery charging is not performed.		Replace the battery.

NOTE: The signal above is available only when the POWER LED is off.

5) Operation when an error is detected

The printer processes are as follows when an error is detected.

- All operations of the mechanical parts and the detectors are stopped.
- The ERROR LED flashes.

3.7 Indicators

The printer panel has the following LED indicators:

The panel has three LED indicators: the POWER LED (Green), ERROR LED (Red), and BATTERY LED (Red). It indicates the printer state by the combination.

1) Power (POWER) LED: Green

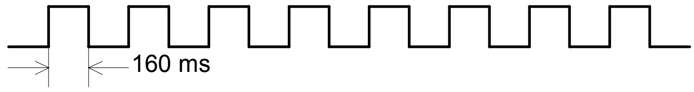
On: Power is ON.

Off: Power is OFF.

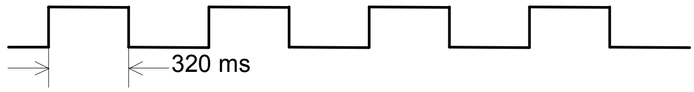
Flashing: During the power-off sequence or when out of wireless communication range.

<Flashing pattern>

During power-off sequence: flashing



Out of wireless communication range



2) Error (ERROR) LED: Red

(1) Power is ON.

On: Offline

- Paper-end.
- During initializing when the power is turned on.
- Roll paper cover open.
- When the power is a using battery and the remaining battery is level S.
- During the power-off sequence.

NOTE: The ERROR LED is off during paper feeding using paper FEED button.

Flashing: Error (See Section 3.6, “Error processing.”)

Off: Online

(2) Power is OFF (with AC adapter and a battery).

Off: Battery is being charged. (BATTERY LED is on.)

On: An error occurred during battery charging.

3) BATTERY LED: Red

(1) Indication of the remaining battery charge

Table 3.7.1 Indication of the Remaining Battery Charge

Name	Description	Response
Level H (high)	The remaining battery charge is between 100% and approximately 50% when the amount of difference between the full battery and level L is 100%.	Continually usable.
Level M (medium)	The remaining battery charge is between approximately 50% and level L when the amount of difference between the full battery and level L is 100%.	Continually usable.
Level L (low)	The battery needs to be replaced because the remaining battery charge is low.	Replace the battery. Or use the AC adapter. Or charge the battery.
Level S (save)	The printer does not operate because the remaining battery charge is too low.	Replace the battery. Or use the AC adapter. Or charge the battery

Level H	Level M	Level L	Level S

0% Approx.50 Approx.0%

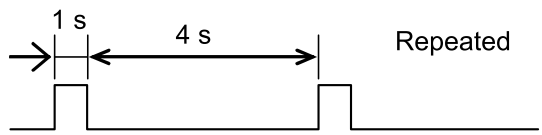
Battery usable capacity

(2) The remaining battery charge and the BATTERY LED indication

Table 3.7.2 BATTERY LED Indication

	Battery	AC adapter	BATTERY LED
Power is ON.	Installed	Installed	On all the time.
		Not installed	Off: Remaining battery charge is level H. Flashing: Remaining battery charge is level M. (*1) On: Remaining battery charge is level L.
	Not installed	Installed	Off.
		Not installed	N/A.
Power is OFF. (*2)	Installed	Installed	On: Battery is being charged. Off: Battery is full-charged.
		Not installed	Off all the time.
	Not installed	Installed	Off all the time.
		Not installed	N/A.

NOTES: *1. The LED flashing pattern in level M is as follows:



*2. Even if the BATTERY LED is on when the power is off, the battery is not charged if the temperature is out of range 0 to 40°C {32 to 104°F}.

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3.8 Switches

1) POWER button (non-rocking push button)

(1) The POWER button located on the left of the upper side of the printer turns the power on or off.

(2) Press down the POWER button for approximately 0.5 seconds to turn the power on.

(3) Press down the POWER button for longer than 2 seconds to turn the power off.

2) Paper FEED button (non-rocking push button)

Function:
- The printer feeds paper based on the line spacing set by **ESC 3**.
- If you press this button once and release it, the printer feeds paper one line. If you hold down the button for longer than approximately 300 ms, the printer feeds paper continuously as long as you hold down the button.
- If you press this button when the cover is open, the printer prints a status sheet. (See to 3.13.)

NOTE: This button is enabled/disabled by **ESC c 5**.

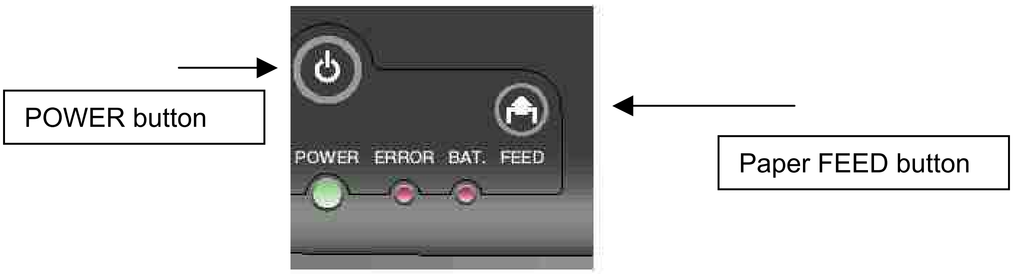


Figure 3.8.1 Panel Switches

3.9 DC Connector



3.10 Paper Sensor

The paper sensor is located in the paper path and detects the paper presence. The paper sensor monitors the white level of the printed face of the roll paper with a reflecting photo sensor.

3.11 Cover Open Button

If you push this button, the roll paper cover opens.

NOTES:
1. Be sure to push this button when you open the roll paper cover.
2. Do not open the roll paper cover during printing.
3. Do not push the roll paper cover open button during autocutting because if you open the roll paper cover during autocutting, it may cause mechanical damage.

3.12 Roll paper Cover Open Sensors

The sensor detects opening/closing of the roll paper cover.

When the roll paper cover is opened, the printer goes offline. If you close the roll paper cover, the printer recovers.

NOTE: The paper-end state is maintained as just before a cover open, because the sensor does not detect paper-end during roll paper cover open.

3.13 Buzzer

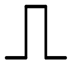
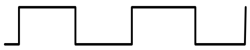
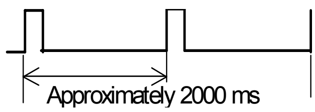
A buzzer is built into the printer and sounds under the following conditions:

- Sounds by commands (commands “Buzzer control [**ESC (A**)]”)
- Sounds autonomously

1) Priorities

Priority		
1	Sounds by commands	
2	Operation sound	Autonomously
3	Warning	Autonomously
4	Processing	Autonomously

2) Autonomous sounds

Reason for sounds	Background of sounds	Sounds	Number of sounds	Stop with memory switch
Operation control	• Printing of status sheet • Execution operation of radio field intensity check	100 ms on, 100 ms off 	1 time	Impossible
Warning	• Remaining battery charge is lower than “L.” • Remaining battery charge is lower than “S.” • Host is disconnected. • Paper is ended. • An error occurred.	1000 ms on, 1000 ms off 	5 times	Possible
Processing	While processing radio field intensity check (4 seconds have passed after the paper FEED button was pressed).	100 ms on, 1900 ms off 	Till print data arrives.	Impossible

3.14 Status Sheet Printing

Prints an operation status sheet for the IEEE 802.11b wireless interface by following the steps below.

(1) Open the roll paper cover.

(2) Press down the paper FEED button until the printer beeps (about for 2 seconds).

(3) Close the roll paper cover.

(4) The printer prints the operation status sheet for the IEEE 802.11b wireless interface.

The status sheet is printed with the font style that is currently selected.

3.15 Self-test

1) Operations to start the self-test:

(1) Close the roll paper cover and turn the power on while pressing the paper FEED button.

(2) Continue holding down the paper FEED button until the ERROR LED comes on.

(3) The current printer status is printed.

(4) The buzzer sounds.

2) Printing the printer settings

The following is printed.

- Control ROM version.
- Serial interface settings.
- IEEE 802.11b wireless interface settings.
- Memory switch settings.
- DIP switch settings.

After the printer prints the message "If you want to continue SELF-TEST printing, please press FEED button." for the last line, the POWER LED flashes and the printer enters the test printing standby state.

3) Starting test print

Press the paper FEED button after the printer settings are printed; then the test print starts.

4) Test print

The following is printed.

- Rolling print of the built-in character set.
- The printer prints "*** completed ***" and ends the self-test.
- The printer autocuts paper.

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3.16 Radio Field Intensity Check

1) Function

This function prints information about 802.11b I/F wireless communication intensity.

2) Starting radio field intensity check

(1) Open the roll paper cover and turn the power on while pressing the paper FEED button.

(2) Press down the paper FEED button twice.

(3) Close the roll paper cover.
Follow the instructions that are printed out.

NOTE: The radio field intensity check can be performed only in the infrastructure mode. In Ad-hoc mode, “This feature is not supported in Ad-hoc mode” is printed.

3) Ending radio field intensity check

(1) Press down the power switch to turn the power off.

3.17 Hexadecimal Dumping

1) Hexadecimal dumping function

This function prints the data transmitted from the host computer in hexadecimal numbers and their corresponding characters.

2) Starting hexadecimal dumping

Open the roll paper cover and turn the power on while pressing the paper FEED button.

3) Hexadecimal dumping operation

After printing "Hexadecimal Dump To terminate..." on the roll paper, the printer prints the received print data in hexadecimal numbers and their corresponding characters.

NOTES:
1. If a character does not correspond to the data received, the printer prints "."
2. During hexadecimal dumping, any commands other than **DLE EOT, DLE ENQ**, and **DLE DC4** do not function.
3. Insufficient print data to fill one line can be printed by pressing the paper FEED button.

<Printing example>

```
Hexadecimal Dump
To terminate hexadecimal dump,
press FEED button three times.



1B 21 00 1B 26 02 40 40 1B 69    . ! . . & . @ @ . i
1B 25 01 1B 63 34 00 1B 30 31    . % . . c 4 . . 0 1
41 42 43 44 45 46 47 48 49 4A    A B C D E F G H I J

               *** completed ***
```

4) Ending hexadecimal dumping

Any of the following operations end hexadecimal dumping

- Press the POWER button and turn the power off.
- Press the paper FEED button three times. → The software is reset and reboots.

3.18 Wireless Communication Setting Initializing Mode (IEEE802.11b or Bluetooth)

Wireless communication settings can be initialized by the following operations.

(1) Open the roll paper cover.
(2) Turn the power on while pressing down the paper FEED button.
(3) Press the paper FEED button 6 times.
(4) Close the roll paper cover.

At this time, the title "Wireless Module setup", the wireless communication setting contents that is currently set, and the instruction procedure are printed.

(5) Open the roll paper cover.
(6) Press the paper FEED button once.
(7) Close the roll paper cover.

The printer prints "1: Initialize", then starts the initialization. The printer is reset and rebooted.

3.19 DIP switches

The combination of DSW1-2, DSW1-3, and DSW1-4, which are on the DIP switch bank on the inner left of the roll paper holder, where serial I/F is installed, switches the RS-232 serial interface signal line data.

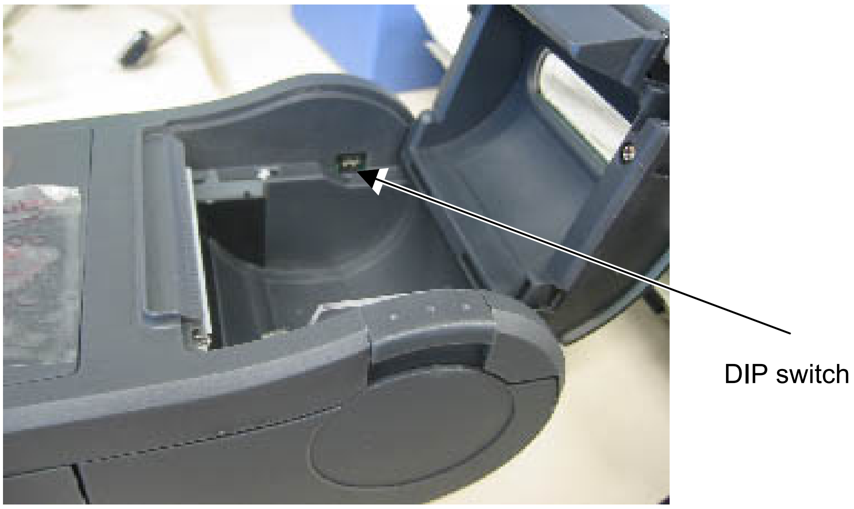


Figure 3.19.1 DIP Switches

Table 3.19.1 DIP Switch Settings

	DSW1-2	DSW1-3	DSW1-4
DTR/DSR control	ON	OFF	ON
RTS/CTS control	OFF	ON	OFF

- Any combinations other than above must not be used.
- DSW1-1 is fixed to OFF.
- DTR/DSR control is selected as the default.

3.20 Memory Switches

Memory switches can define the following:

- Memory switch: Msw8 (See table below)
- Customized values (See table below)
- Communication conditions of the serial interface
- Communication conditions of the Bluetooth interface (With the Bluetooth interface model)

Memory switches can be set and cleared using **GS (E** command.

1) Memory switch

Table 3.20.1 Memory Switch Msw8

Switch number	Function	Value	
		48 (OFF)	49 (ON)
Msw8-1	Transmission of status information	Does not transmit	Transmits
Msw8-2	Buzzer sounds for low battery warning	Does not sound	Sounds
Msw8-3	Buzzer sounds for host disconnection warning	Does not sound	Sounds
Msw8-4	Buzzer sounds for roll paper end warning	Does not sound	Sounds
Msw8-5	Buzzer sounds for error occurrence warning	Does not sound	Sounds
Msw8-6	Reserved	---	---
Msw8-7	Reserved	---	---
Msw8-8	Reserved	---	---

2) Customized value

Function	Selection
Paper width	58 mm or 60 mm {2.28" or 2.36"}
Automatic power off time	Automatic power off is disabled or 1 to 60 minutes
Print density	70%, 75%, 80%, 85%, 90%, 95%, 100%, 105%, 110%, 115%, 120%, 125%, 130%

3) Communication conditions for the serial interface

Function	Selection
Communication speed	9600 bps, 19200 bps, 38400 bps
Parity	None, even, odd

4) Communication conditions for the Bluetooth interface (With the Bluetooth interface model)

Function	Selection
Passkey	Arbitary character string (4 to 16 characters)
Device name	Arbitary character string (1 to 64 characters)

3.21 Factory Setting Mode

- IEEE802.11b model

Classification	Item	Factory setting mode
Serial interface communication condition	Handshake	DTR/DSR
	Transmission speed	19200 bps
	Parity	None
IEEE802.11b interface wireless configuration	Network mode	Ad-hoc
	SSID	EpsonNetIBSS
	Transmission Rate	Auto
	RTS Threshold	512
	Power Management	Disable
	AP density	Low
	Authentication Algorithm	Open System
	Encryption	Disable
	Encryption Key	Key1
IEEE802.11b wireless interface TCP/IP configuration	Get IP Address	Manual
	APIPA	Disable
	Set using PING	Enable
	IP Address	192.168.192.168
	Subnet mask	255.255.255.0
	Default Gateway	0.0.0.0
Memory switch	Transmission of status information	Enable
	Buzzer sounds for low battery warning	Enable
	Buzzer sounds for host disconnection warning	Enable
	Buzzer sounds for roll paper end warning	Enable
	Buzzer sounds for error occurrence warning	Enable
Customized value	Paper width	58 mm
	Auto power off period	20 minutes
	Print density	100 %

• Bluetooth model

Classification	Item	Factory setting mode
Serial interface communication condition	Handshake	DTR/DSR
	Transmission speed	19200 bps
	Parity	None
Bluetooth interface wireless configuration	Passkey	“4254”
	Device name	“TAIYO SPP”
Memory switch	Transmission of status information	Enable
	Buzzer sounds for low battery warning	Enable
	Buzzer sounds for host disconnection warning	Disable
	Buzzer sounds for roll paper end warning	Enable
	Buzzer sounds for error occurrence warning	Enable
Customized value	Paper width	58 mm
	Auto power off period	20 minutes
	Print density	100 %

4. EXTERNAL SPECIFICATION

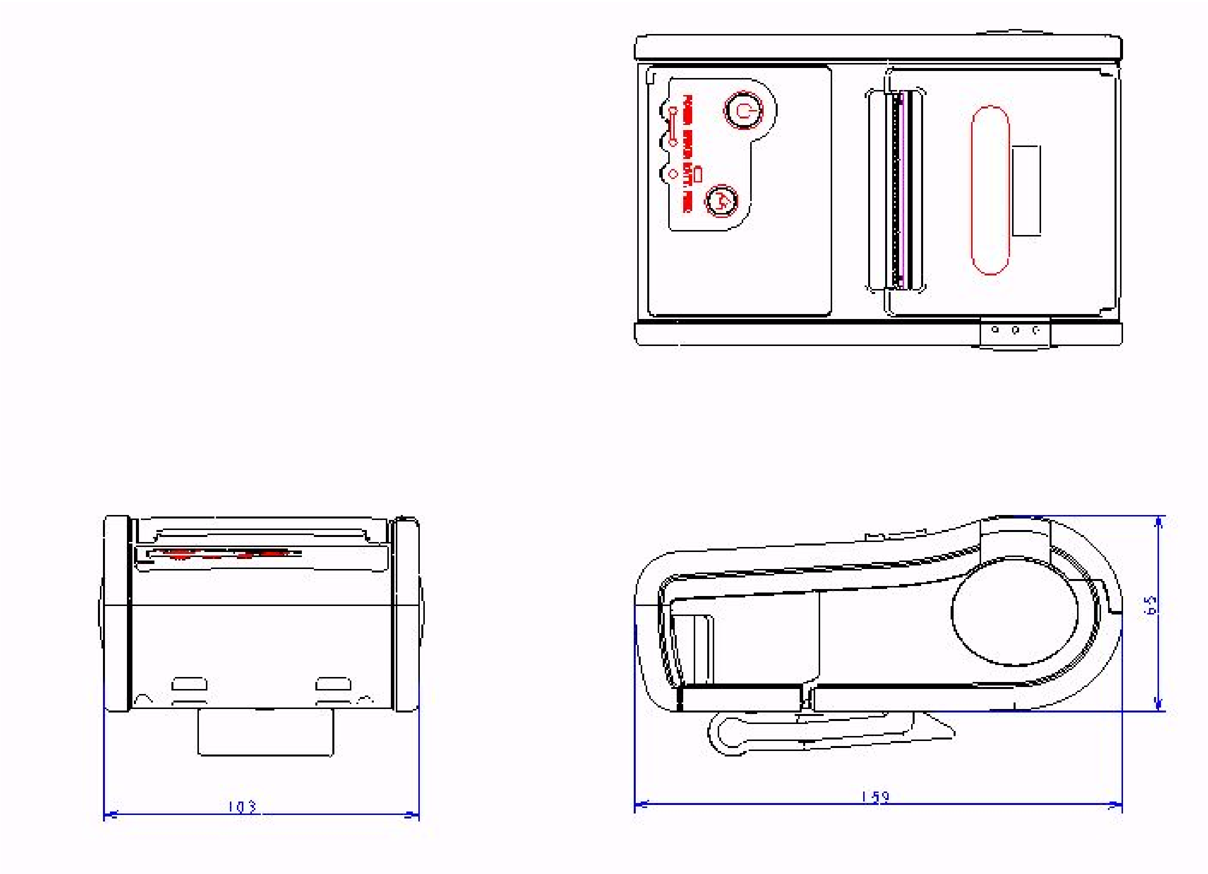
4.1 External Dimensions and Mass

Height: 65 mm {2.56"}
Width: 103 mm {4.06"}
Depth: 159 mm {6.26"}
The dimensions above do not include the belt clip.
Mass: Approximately 670 g {1.47 lb} (Including the battery, but not including paper)

4.2 Color

EPSON standard color (EDG)

4.3 External Appearance



[Units: mm]

Figure 4.3.1 External Appearance

5. OPTIONS AND CONSUMABLES

5.1 Standard Accessories

- Roll paper
- Battery (LIP-2500)
- User’s manual

5.2 Options

- AC adapter (PS-10)
  Compliant input AC voltage: 100V to 240V
- Quick charger (OT-CH60)
  Compliant input AC voltage: 100V to 240V
- RS232 cable (OT-RS60)
- Shoulder strap (OT-ST60)

5.3 Consumables

- Battery (LIP-2500)

Confidential

6. COMMANDS

6.1 Command Notation

XXXX

[Name]	The name of the command.
[Format]	The code sequence. *[ ]k* indicates the contents in brackets [ ] should be repeated *k* times.
[Range]	Gives the allowable ranges, if any, for the command parameters.
[Default]	Gives the default values, if any, for the arguments.
[Description]	Describes the function of the command. ”–“ in the table indicates 0 or 1.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[Reference]	Gives a reference, if any.

6.2 Explanation of Terms

1) Real-time command

Real-time commands are identified with a **DLE** extension such as **DLE EOT**, **DLE ENQ,** or **DLE DC4**. The printer executes these commands as soon as they are received.

2) NV memory write command

NV memory write commands delete or store data in the NV memory (flash ROM)

GS (C <some functions>, **GS (E** <some functions>, **GS (L** <some functions>,
GS (M <some functions>, **GS g 0**

3) ESC/POS Handshaking Protocol

ESC/POS Handshaking Protocol is a handshaking protocol between the host computer and the printer when the printer transmits data. The ESC/POS Handshaking Protocol is required if the following commands are executed:

GS (C <some functions>, **GS (E** <some functions>, **GS (L** <some functions>

4) Print buffer

The print buffer is used to store image data for printing

5) Receive buffer

The receive buffer is used to store data from the host computer. All received data is stored in this buffer and processed in the order received.

6) Maximum printable area

The maximum printable area of this printer is as follows:

Paper width	Standard Mode (Horizontal direction)	Page Mode	
		Horizontal direction	Vertical direction
58 mm model	52.5 mm {420/203"}	52.5 mm {420/203"}	150.0 mm {1200/203"}
60 mm model	54.0 mm {432/203"}	54.0 mm {432/203"}	150.0 mm {1200/203"}

7) Horizontal or vertical motion units

The horizontal or vertical motion units are used for calculating the setting values for various commands and are [Horizontal motion unit: 0.125mm {1/203"} / Vertical motion unit: 0.125mm {1/203"}].

8) Left edge of the print area

The left edge of the print area indicates the first column for character(s) to be developed, and also the print position to be moved when (nL + $nH \times 256$) = 0 is specified with **ESC $**.

- In standard mode, the left edge of the print area is the position of the left margin.
- In page mode, the left edge of the print area is the position of the left edge when the starting position specified with **ESC T** is viewed as the left top of the print area.

9) Raster format

Raster format is a format where data is set in descending order (bit 7, 6, …, 0) from the left horizontally.

d1	*d2*	*d3*
d4	*d5*	*d6*
d7	*d8*	*d9*
MSB LSB	MSB LSB	MSB LSB

10) Inch

A unit of length. One inch is 25.4 mm.

11) dpi

dpi (dots per inch) is the number of dots per 25.4 mm.

6.3 Control Commands

HT

[Name] Horizontal tab

[Format] ASCII HT
Hex 09
Decimal 9

[Description] • Moves the print position to the next horizontal tab position.

LF

[Name] Print and line feed

[Format] ASCII LF
Hex 0A
Decimal 10

[Description] • Prints the data in the print buffer and feeds one line, based on the current line spacing.

FF (In page mode)

[Name] Print and return to standard mode (in page mode)

[Format] ASCII FF
Hex 0C
Decimal 12

[Description] • Prints all the data in the print buffer collectively and switches from page mode to standard mode.

CAN

[Name] Cancel print data in page mode

[Format] ASCII CAN
Hex 18
Decimal 24

[Description] • In page mode, deletes all the print data in the current print area.

DLE EOT *n*

[Name] Transmit real-time status

[Format]

ASCII	DLE	EOT	*n*
Hex	10	04	*n*
Decimal	16	4	*n*

[Range] $1 \leq n \leq 4$

[Description]

- Transmits the real-time status.

n	Function
1	Transmits printer status.
2	Transmits offline cause status.
3	Transmits error cause status.
4	Transmits roll paper sensor status.

- This printer transmits the following status in real time.
  - Printer status (*n* = 1)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	Does not go offline by low battery.
	On	04	4	Offline by low battery.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	--	--	--	Reserved.
6	Off	00	0	Paper FEED button is turned off.
	On	40	64	Paper FEED button is turned on.
7	Off	00	0	Fixed.

  - Offline cause status (*n* = 2)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open.
3	Off	00	0	Paper is not being fed by the paper FEED button.
	On	08	8	Paper is being fed by the paper FEED button.
4	On	10	16	Fixed.
5	Off	00	0	No paper end stop.
	On	20	32	Printing stopped by paper end.
6	Off	00	0	No error.
	On	40	64	Error occurred.
7	Off	00	0	Fixed.

• Error cause status (n = 3)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2	--	--	--	Reserved.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	On	10	16	Fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Fixed.

• Roll paper sensor status (n = 4)

Bit	Off/On	Hex	Decimal	Status
0	Off	00	0	Fixed.
1	On	02	2	Fixed.
2, 3	--	--	--	Reserved.
4	On	10	16	Fixed.
5, 6	Off	00	0	Roll paper end sensor: paper present.
	On	60	96	Roll paper end sensor: paper not present.
7	Off	00	0	Fixed.

Bits 5 and 6: While the roll cover is opening, this shows the state when the cover was still closed.

[Notes]

- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs this command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- Transmit this command using the following method:
  - When this command is transmitted, the data following must not be transmitted until the status is received.
  - However, if this command must be transmitted continuously, it is possible to transmit up to 4 commands at once.
    In this case, the data following must not be transmitted until the all status is received.
    If this command is transmitted without using the above method, the status may not be received.

DLE ENQ *n*

[Name] Send real-time request to printer

[Format]

ASCII	DLE	ENQ	*n*
Hex	10	05	*n*
Decimal	16	5	*n*

[Range] *n* = 2

[Description]
- Responds to a request in real-time from the host computer.

n	Function
2	Recovers from a recoverable error after clearing the receive and print buffers. • This command is ignored unless a recoverable error has occurred.

[Notes]
- Use this command after removing the cause of the error.
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.

DLE DC4 *fn a b* (*fn* = 2)

[Name] Execute power-off sequence

[Format]

ASCII	DLE	DC4	*fn*	*a*	*b*
Hex	10	14	*fn*	*a*	*b*
Decimal	16	20	*fn*	*a*	*b*

[Range]
fn = 2
a = 1
b = 8

[Description]
- Executes the printer power-off sequence and transmits the power-off notice.
  - Stores the values of the maintenance counter.
  - Sets the interface to BUSY.
  - Sets the printer to standby mode.
  - Shuts the power off.

[Notes]
- The printer does not transmit the power-off notice when memory switch [Msw 8-1] is set to off.
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.

DLE DC4 *fn m* (*fn* = 7)

[Name] Transmit specified status in real-time

[Format]

ASCII	DLE	DC4	*fn*	*m*
Hex	10	14	*fn*	*m*
Decimal	16	20	*fn*	*m*

[Range] *fn* = 7
m = 1, 5

[Description]
- Transmits the specified status in real-time.

m	Function	Related command
1	Transmits basic ASB status.	**GS a**
5	Transmits battery status.	None

- The status format of *m* = 1 is the same as the format of the related command in the table above.
  See the description of the related command corresponding to *m*.
- Battery status (*m* = 5)

Status	Hexadecimal	Decimal	Amount of data
Header	37	55	1 byte
Identifier	45	69	1 byte
Power source (*1)	30 or 31	48 or 49	1 byte
Battery remaining amount (*2)	30 ~ 34	48 ~ 52	1 byte
NUL	00	0	1 byte

(*1) The power source is identified as follows:

Power source	Hexadecimal	Decimal
AC adapter	30	48
Battery	31	49

(*2) The battery remaining amount level is specified as follows:

Battery remaining amount level	Hexadecimal	Decimal
H level	30	48
M level	31	49
L level	32	50
S level	33	51
Battery not installed	34	52

[Notes]
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- When this command is transmitted, the data following must not be transmitted until the status is received.

DLE DC4 *fn d1…d7* (*fn* = 8)

[Name]	Clear buffer(s)
[Format]	ASCII DLE DC4 *fn d1…d7* Hex 10 14 *fn d1…d7* Decimal 16 20 *fn d1…d7*
[Range]	*fn* = 8 *d1* = 1, *d2* = 3, *d3* = 20, *d4* = 1, *d5* = 6, *d6* = 2, *d7* = 8

[Description]
- Clears all data stored in the receive buffer and the print buffer and transmits Clear response.
  - If a recoverable error occurs, recovers from the error.

[Notes]
- Do not use this command in a system that uses the printer with the OPOS driver or the JavaPOS driver provided by Seiko Epson Corporation.
- Take the following into consideration:
  - If the received data includes a data string matching this command, the printer performs the command. Users must consider this.
    For example: Graphic data might accidentally include a data string matching this command.
  - Do not embed this command within another command.
    For example: Graphic data might include this command.
- When this command is transmitted, the data following must not be transmitted until the status is received.

ESC FF

[Name]	Print data in page mode
[Format]	ASCII ESC FF Hex 1B 0C Decimal 27 12

[Description]
- In page mode, prints all the data in the print buffer collectively.

ESC SP *n*

[Name]	Set right-side character spacing				
[Format]	ASCII	ESC	SP	*n*	
	Hex	1B	20	*n*	
	Decimal	27	32	*n*	
[Range]	$0 \leq n \leq 255$				
[Default]	$n = 0$				
[Description]	• Sets the right-side character spacing to [$n \times$ (horizontal or vertical motion unit)].				

ESC $ *nL nH*

[Name]	Set absolute print position				
[Format]	ASCII	ESC	$	*nL*	*nH*
	Hex	1B	24	*nL*	*nH*
	Decimal	27	36	*nL*	*nH*
[Range]	$0 \leq (nL + nH \times 256) \leq 65535$ $(0 \leq nL \leq 255, 0 \leq nH \leq 255)$				
[Description]	• Moves the print position to [$(nL + nH \times 256) \times$ (horizontal or vertical motion unit)] from the left edge of the print area.				

ESC (A *pL pH fn [parameters]*

[Name] Control beeper tones

[Description] • Controls beeper tones.

- *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
- *fn* specifies the function.
- *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**ESC (A *pL pH fn n c t***	48	Beeps the buzzer.

<Function 48> ESC (A *pL pH fn n c t* (*fn* = 48)

[Name] Beeps the buzzer

[Format]

ASCII	ESC	(	A	*pL*	*pH*	*fn*	*n*	*c*	*t*
Hex	1B	28	41	*pL*	*pH*	*fn*	*n*	*c*	*t*
Decimal	27	40	65	*pL*	*pH*	*fn*	*n*	*c*	*t*

[Range] (*pL* + *pH* × 256) = 4 (*pL* = 4, *pH* = 0)

fn = 48

48 ≤ *n* ≤ 58

1 ≤ *c* ≤ 63

10 ≤ *t* ≤ 255

[Description] • Beeps the beeper.

- *n* specifies the beeper sound.

n	Beeper sound
48	Does not beep.
49	1280Hz: 1000ms beeping
50	4100Hz: 1000ms beeping
51	1280Hz: 200ms beeping
52	4100Hz: 200ms beeping
53	1280Hz: 200ms beeping → 200ms off → 200ms beeping
54	4100Hz: 200ms beeping → 200ms off → 200ms beeping
55	1280Hz: 500ms beeping
56	4100Hz: 500ms beeping
57	1280Hz: 200ms beeping → 200ms off → 200ms beeping → 200ms off → 200ms beeping
58	4100Hz: 200ms beeping → 200ms off → 200ms beeping → 200ms off → 200ms beeping

- *c* specifies the number of beeps.
- *t* specifies the beeping cycle time (*t* × 100 ms).

[Note] • The "Does not beep" (*n* = 48) affects beeping caused by this function only. It does not affect warning beeping (Example: low battery, and roll paper end.)

ESC – *n*

[Name]	Turn underline mode on/off
[Format]	ASCII ESC – *n* Hex 1B 2D *n* Decimal 27 45 *n*
[Range]	$0 \le n \le 2$, $48 \le n \le 50$
[Default]	$n = 0$
[Description]	• Turns underline mode on or off.

n	Function
0, 48	Turns off underline mode.
1, 49	Turns on underline mode, set at 1-dot width.
2, 50	Turns on underline mode, set at 2-dot width.

ESC 3 *n*

[Name]	Set line spacing
[Format]	ASCII ESC 3 *n* Hex 1B 33 *n* Decimal 27 51 *n*
[Range]	$0 \le n \le 255$
[Default]	$n = 30$ (Equivalent to 3.75 mm.)
[Description]	• Sets the line spacing to [$n \times$ (vertical or horizontal motion unit)].

ESC = *n*

[Name]	Select peripheral device
[Format]	ASCII ESC = *n* Hex 1B 3D *n* Decimal 27 61 *n*
[Range]	$1 \le n \le 3$
[Default]	$n = 1$
[Description]	• Selects the device to which the host computer transmits data.

n	Function
1, 3	Enables printer.
2	Disables printer.

• When the printer is disabled ($n = 2$), all data except this command and the real-time commands are ignored.

ESC @

[Name] Initialize printer

[Format]

ASCII	ESC	@
Hex	1B	40
Decimal	27	64

[Description]
- Clears the data in the print buffer and resets the printer modes to the modes that were in effect when the power was turned on.
  Keeps the following data:
  - Contents stored in the NV user memory.
  - Contents defined for the NV graphics.
  - Maintenance counter value.
  - Setting value specified with **GS (E**.

ESC D *n1...nk NUL*

[Name] Set horizontal tab positions

[Format]

ASCII	ESC	D	*n1...nk*	*NUL*
Hex	1B	44	*n1...nk*	*00*
Decimal	27	68	*n1...nk*	*0*

[Range] $1 \leq n1 \leq n2 \leq ... \leq nk \leq 255$
$0 \leq k \leq 32$

[Default] *n* = 8, 16, 24, 32, 40, ... , 232, 240, 248
[for Font B (10 × 24) in a standard character size width]

[Description]
- Sets horizontal tab positions.
  - *n* specifies the number of digits from the setting position to the left edge of the print area.
  - *k* is used to indicate the number of bytes set for the horizontal tab position.

ESC E *n*

[Name] Turn emphasized mode on/off

[Format]

ASCII	ESC	E	*n*
Hex	1B	45	*n*
Decimal	27	69	*n*

[Range] $0 \leq n \leq 255$

[Default] *n* = 0

[Description]
- Turns emphasized mode on or off.
  - When the LSB of *n* is 0, emphasized mode is turned off.
  - When the LSB of *n* is 1, emphasized mode is turned on.

ESC J *n*

[Name] Print and feed paper

[Format]

ASCII	ESC	J	*n*
Hex	1B	4A	*n*
Decimal	27	74	*n*

[Range] $0 \leq n \leq 255$

[Description]
- Prints the data in the print buffer and feeds the paper [$n \times$ (vertical or horizontal motion unit)].

ESC L

[Name] Select page mode

[Format]

ASCII	ESC	L
Hex	1B	4C
Decimal	27	76

[Description]
- Switches from standard mode to page mode.

ESC M *n*

[Name] Select character font

[Format]

ASCII	ESC	M	*n*
Hex	1B	4D	*n*
Decimal	27	77	*n*

[Range] $0 \leq n \leq 2$, $48 \leq n \leq 50$

[Default] $n = 1$

[Description]
- Selects character font.

n	Character font
0, 48	Character font A (12 × 24)
1, 49	Character font B (10 × 24)
2, 50	Character font C (8 × 16)

ESC R *n*

[Name] Select an international character set

[Format]

ASCII	ESC	R	*n*
Hex	1B	52	*n*
Decimal	27	82	*n*

[Range] $0 \le n \le 15$

[Default] *n* = 0 [Other than the following model]
n = 8 [for Japanese model]

[Description] • Selects international character set.

n	International character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea
14	Slovenia / Croatia
15	China

[Reference] "3.2.13 International Character Sets"

ESC S

[Name] Select standard mode

[Format]

ASCII	ESC	S
Hex	1B	53
Decimal	27	83

[Description] • Switches from page mode to standard mode.

ESC T *n*

[Name] Select print direction in page mode

[Format]

ASCII	ESC	T	*n*
Hex	1B	54	*n*
Decimal	27	84	*n*

[Range] $0 \le n \le 3$, $48 \le n \le 51$

[Default] $n = 0$

[Description] • In page mode, selects the print direction and starting position.

n	Print direction	Starting position
0, 48	Left to right	Upper left
1, 49	Bottom to top	Lower left
2, 50	Right to left	Lower right
3, 51	Top to bottom	Upper right

ESC W *xL xH yL yH dxL dxH dyL dyH*

[Name] Set print area in page mode

[Format]

ASCII	ESC	W	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Hex	1B	57	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Decimal	27	87	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*

[Range]
$0 \le (xL + xH \times 256) \le 65535$ $(0 \le xL \le 255, 0 \le xH \le 255)$
$0 \le (yL + yH \times 256) \le 65535$ $(0 \le yL \le 255, 0 \le yH \le 255)$
$1 \le (dxL + dxH \times 256) \le 65535$ $(0 \le dxL \le 255, 0 \le dxH \le 255)$
$1 \le (dyL + dyH \times 256) \le 65535$ $(0 \le dyL \le 255, 0 \le dyH \le 255)$

[Default]
$(xL + xH \times 256) = 0$ $(xL = 0, xH = 0)$
$(yL + yH \times 256) = 0$ $(yL = 0, yH = 0)$
$(dxL + dxH \times 256) = 420$ $(dxL = 164, dxH = 1)$ [when 58 mm paper width is selected]
$(dxL + dxH \times 256) = 432$ $(dxL = 176, dxH = 1)$ [when 60 mm paper width is selected]
$(dyL + dyH \times 256) = 1200$ $(dyL = 176, dyH = 4)$

[Description]
• In page mode, sets the size and the logical origin of the print area.
• *xL*, *xH* specify the horizontal logical origin as $[(xL + xH \times 256) \times$ (horizontal motion unit)].
• *yL*, *yH* specify the vertical logical origin as $[(yL + yH \times 256) \times$ (vertical motion unit)].
• *dxL*, *dxH* specify the horizontal dimension of print area as $[(dxL + dxH \times 256) \times$ (horizontal motion unit)].
• *dyL*, *dyH* specify the vertical dimension of print area as $[(dyL + dyH \times 256) \times$ (vertical motion unit)].

ESC \ *nL nH*

[Name] Set relative print position

[Format]

ASCII	ESC	\	*nL*	*nH*
Hex	1B	5C	*nL*	*nH*
Decimal	27	92	*nL*	*nH*

[Range] $-32768 \leq (nL + nH \times 256) \leq 32767$

[Description]
- Moves the print position to [($nL + nH \times 256$) × (horizontal or vertical motion unit)] from the current position.
  - A positive number specifies movement to the right, and a negative number specifies movement to the left.

ESC a *n*

[Name] Select justification

[Format]

ASCII	ESC	a	*n*
Hex	1B	61	*n*
Decimal	27	97	*n*

[Range] $0 \leq n \leq 2$, $48 \leq n \leq 50$

[Default] $n = 0$

[Description]
- In standard mode, aligns all the data in one line to the selected layout.

n	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

ESC c 5 *n*

[Name] Enable/disable panel buttons

[Format]

ASCII	ESC	c	5	*n*
Hex	1B	63	35	*n*
Decimal	27	99	53	*n*

[Range] $0 \leq n \leq 255$

[Default] $n = 0$

[Description]
- Enables or disables the panel buttons.
  - When the LSB of *n* is 0, the panel buttons are enabled.
  - When the LSB of *n* is 1, the panel buttons are disabled.

[Notes]
- This command affects the FEED button.
- FEED button is enabled regardless of the settings with this command, when a status sheet is printed. Even if the button is pressed, paper cannot be fed.
- FEED button is disabled regardless of the settings with this command, when the roll paper cover is open, or the roll paper end sensor detects a paper end.

ESC d *n*

[Name] Print and feed *n* lines

[Format]

ASCII	ESC	d	*n*
Hex	1B	64	*n*
Decimal	27	100	*n*

[Range] $0 \leq n \leq 255$

[Description] • Prints the data in the print buffer and feeds the paper [$n \times$ (current line spacing)].

[Note] • The maximum paper feed amount is 1016 mm {40"}.

ESC t *n*

[Name] Select character code table

[Format]

ASCII	ESC	t	*n*
Hex	1B	74	*n*
Decimal	27	116	*n*

[Range] $0 \leq n \leq 5$, $16 \leq n \leq 19$, $n = 255$

[Default] $n = 0$

[Description] • Selects page *n* from the character code table.

n	Character code table
0	Page 0 [PC437 (USA: Standard Europe)]
1	Page 1 [Katakana]
2	Page 2 [PC850 (Multilingual)]
3	Page 3 [PC860 (Portuguese)]
4	Page 4 [PC863 (Canadian-French)
5	Page 5 [PC865 (Nordic)]
16	Page 16 [WPC1252]
17	Page 17 [PC866 (Cyrillic #2)]
18	Page 18 [PC852 (Latin 2)]
19	Page 19 [PC858 (Euro)]
255	Page 255 [User-defined page]

[Reference] "3.2 Character Code Tables"

ESC { *n*

[Name] Turn upside-down print mode on/off

[Format]

ASCII	ESC	{	*n*
Hex	1B	7B	*n*
Decimal	27	123	*n*

[Range] $0 \le n \le 255$

[Default] $n = 0$

[Description]
- In standard mode, turns upside-down print mode on or off.
  - When the LSB of *n* is 0, upside-down print mode is turned off.
  - When the LSB of *n* is 1, upside-down print mode is turned on.

GS ! *n*

[Name] Select character size

[Format]

ASCII	GS	!	*n*
Hex	1D	21	*n*
Decimal	29	33	*n*

[Range] $0 \le n \le 7$, $16 \le n \le 23$, $32 \le n \le 39$, $48 \le n \le 55$, $64 \le n \le 71$,
$80 \le n \le 87$, $96 \le n \le 103$, $112 \le n \le 119$
(1 ≤ Enlargement in vertical direction ≤ 8,   1 ≤ Enlargement in horizontal direction ≤ 8)

[Default] $n = 0$

[Description]
- Selects character size (enlargement in vertical and horizontal directions).

(*n*) Bit	Off/On	Hex	Decimal	Function
0 - 2	See table [Enlarged in vertical direction]			Selects the times enlarged in the vertical direction.
3	Off	00	0	Reserved.
4 - 6	See table [Enlarged in horizontal direction]			Selects the times enlarged in the horizontal direction.
7	Off	00	0	Reserved.

[Enlarged in vertical direction]

Hex	Decimal	Enlargement
00	0	1 time (standard)
01	1	2 times
02	2	3 times
03	3	4 times
04	4	5 times
05	5	6 times
06	6	7 times
07	7	8 times

[Enlarged in horizontal direction]

Hex	Decimal	Enlargement
00	0	1 time (standard)
10	16	2 times
20	32	3 times
30	48	4 times
40	64	5 times
50	80	6 times
60	96	7 times
70	112	8 times

GS $ *nL nH*

[Name] Set absolute vertical print position in page mode

[Format]

ASCII	GS	$	*nL*	*nH*
Hex	1D	24	*nL*	*nH*
Decimal	29	36	*nL*	*nH*

[Range] $0 \le (nL + nH \times 256) \le 65535$ $(0 \le nL \le 255, 0 \le nH \le 255)$

[Description]
- In page mode, moves the vertical print position to [($nL + nH \times 256$) × (vertical or horizontal motion unit)] from the starting position set with **ESC T**.

GS (C *pL pH m fn b [c1 c2] [d1...dk]*

[Name] Edit NV user memory

[Description]
- Edits the data in the NV user memory.
  - *pL*, *pH* specify ($pL + pH \times 256$) as the number of bytes after *pH* (*m*, *fn*, *b*, *[c1 c2]*, and *[d1...dk]*).
  - *fn* specifies the function.
  - *c1*, *c2* specify the key code (which identifies the record).
  - *[d1...dk]* specify the process of each function.

fn	Format	Function No.	Function name
0, 48	**GS (C *pL pH m fn b c1 c2***	0	Delete the specified record.
1, 49	**GS (C *pL pH m fn b c1 c2 d1...dk***	1	Store the data in the specified record.
2, 50	**GS (C *pL pH m fn b c1 c2***	2	Transmit the data in the specified record.
3, 51	**GS (C *pL pH m fn b***	3	Transmit capacity of the NV user memory currently being used.
4, 52	**GS (C *pL pH m fn b***	4	Transmit the remaining capacity of the NV user memory.
5, 53	**GS (C *pL pH m fn b***	5	Transmit the key code list.
6, 54	**GS (C *pL pH m fn b d1 d2 d3***	6	Delete all data in the NV user memory.

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands while the printer is BUSY.
- When <Function 2, 3, 4, or 5> is transmitted, the data following must not be transmitted until the status is received. And, it will be necessary to perform the ESC/POS Handshaking Protocol procedures when using <Function 2 or 5>.
- The number of items registered in the NV user memory must be 50 or fewer to keep the boot up time of the printer short enough.
  - The boot up time of the printer is longer by one second maximum when the number of items registered is 50.

<Function 0> **GS (C *pL pH m fn b c1 c2*** (*fn* = 0, 48)

[Name]	Delete the specified record										
[Format]	ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
	Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*
	Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*

[Range] $(pL + pH \times 256) = 5$ $(pL = 5, pH = 0)$
$m = 0$
$fn = 0, 48$
$b = 0$
$32 \leq c1 \leq 126$
$32 \leq c2 \leq 126$

[Description] • Deletes the record specified by the key codes (*c1*, *c2*) in the NV user memory.

<Function 1> **GS (C *pL pH m fn b c1 c2 d1...dk*** (*fn* = 1, 49)

[Name]	Store the data in the specified record											
[Format]	ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*
	Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*
	Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*c1*	*c2*	*d1...dk*

[Range] $6 \leq (pL + pH \times 256) \leq 65535$ $(0 \leq pL \leq 255, 0 \leq pH \leq 255)$
$m = 0$
$fn = 1, 49$
$b = 0$
$32 \leq c1 \leq 126$
$32 \leq c2 \leq 126$
$32 \leq d \leq 254$
$k = (pL + pH \times 256) - 5$
The entire capacity size = 384KB.
(Uses the same area in the NV graphics memory.)

[Description] • Stores the data (*d1...dk*) as the record specified by the key codes (*c1*, *c2*) in the NV user memory.

[Notes]
- In cases where there is insufficient capacity available for amounts of data $(pL + pH \times 256) - 5$, this function is ignored.
- The number of items registered in the NV user memory or NV graphics must be 50 or fewer to keep the execution time of this function short enough. The execution time is 80 seconds or less when the number of items registered is 50 or fewer.
  - The execution time for 50 items is 80 seconds or fewer.
  - The execution time for 100 items is 160 seconds or fewer.

<Function 2> **GS (C *pL pH m fn b c1 c2*** (*fn* = 2, 50)

[Name]	Transmit the data in the specified record
[Format]	ASCII GS (C *pL pH m fn b c1 c2* Hex 1D 28 43 *pL pH m fn b c1 c2* Decimal 29 40 67 *pL pH m fn b c1 c2*
[Range]	($p_L + p_H \times 256$) = 5 (p_L = 5, p_H = 0) *m* = 0 *fn* = 2, 50 *b* = 0 $32 \leq c1 \leq 126$ $32 \leq c2 \leq 126$
[Description]	• Transmits the data for the record specified by the key codes (*c1*, *c2*) in the NV user memory.

<Function 3> **GS (C *pL pH m fn b*** (*fn* = 3, 51)

[Name]	Transmit capacity of the NV user memory currently being used
[Format]	ASCII GS (C *pL pH m fn b* Hex 1D 28 43 *pL pH m fn b* Decimal 29 40 67 *pL pH m fn b*
[Range]	($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0) *m* = 0 *fn* = 3, 51 *b* = 0
[Description]	• Transmits the number of bytes of memory used in the NV user memory.

<Function 4> **GS (C *pL pH m fn b*** (*fn* = 4, 52)

[Name]	Transmit the remaining capacity of the NV user memory
[Format]	ASCII GS (C *pL pH m fn b* Hex 1D 28 43 *pL pH m fn b* Decimal 29 40 67 *pL pH m fn b*
[Range]	($p_L + p_H \times 256$) = 3 (p_L = 3, p_H = 0) *m* = 0 *fn* = 4, 52 *b* = 0
[Description]	• Transmits the number of bytes of remaining memory (unused area) in the NV user memory.

<Function 5> **GS (C *pL pH m fn b*** (*fn* = 5, 53)

[Name] Transmit the key code list

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*

[Range] $(pL + pH \times 256) = 3$ ($pL = 3$, $pH = 0$)
$m = 0$
$fn = 5, 53$
$b = 0$

[Description]
- Transmits the key code list in the NV user memory.

<Function 6> **GS (C *pL pH m fn b d1 d2 d3*** (*fn* = 6, 54)

[Name] Delete all data in the NV user memory

[Format]

ASCII	GS	(	C	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*
Hex	1D	28	43	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*
Decimal	29	40	67	*pL*	*pH*	*m*	*fn*	*b*	*d1*	*d2*	*d3*

[Range] $(pL + pH \times 256) = 6$ ($pL = 6$, $pH = 0$)
$m = 0$
$fn = 6, 54$
$b = 0$
$d1 = 67$
$d2 = 76$
$d3 = 82$

[Description]
- Deletes all data in the NV user memory.

GS (D pL pH *m [a1 b1]...[ak bk]*

[Name] Enable/disable real-time command

[Format]

ASCII	GS	(	D	*pL*	*pH*	*m*	*[a1 b1]...[ak bk]*	
Hex	1D	28	44	*pL*	*pH*	*m*	*[a1 b1]...[ak bk]*	
Decimal	29	40	68	*pL*	*pH*	*m*	*[a1 b1]...[ak bk]*	

[Range] $3 \leq (pL + pH \times 256) \leq 65535$ $(0 \leq pL \leq 255, 0 \leq pH \leq 255)$
m = 20
a = 2
b = 0, 1, 48, 49

[Default] *b* = 0

[Description]
- Enables or disables the real-time command specified by *a*.
- *pL*, *pH* specify ($pL + pH \times 256$) as the number of bytes after *pH* (*m* and *[a1 b1]...[ak bk]*).

a	*b*	Function
2	0, 48	**DLE DC4 *fn a b*** (*fn* = 2): Not processed (disabled).
	1, 49	**DLE DC4 *fn a b*** (*fn* = 2): Processed (enabled).

[Note]
- If graphics data includes a data string matching **DLE DC4** (*fn* = 2), it is recommended to use this command in advance to disable the real-time commands.

GS (E *pL* *pH* *fn* *[parameters]*

[Name] Set user setup commands

[Description]
- Controls the user setting modes.
- *pL*, *pH* specify (*pL* + *pH* ×256) as the number of bytes after *pH* (*fn* and *[parameters]*).
- *fn* specifies the function.
- *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
1	**GS (E *pL pH fn d1 d2***	1	Change into the user setting mode.
2	**GS (E *pL pH fn d1 d2 d3***	2	End the user setting mode session.
3	**GS (E *pL pH fn [a1 b18... b11] ... [ak bk8... bk1]***	3	Change the settings of the memory switch.
4	**GS (E *pL pH fn a***	4	Transmit the settings of the memory switch.
5	**GS (E *pL pH fn [a1 n1L n1H] ... [ak nkL nkH]***	5	Set the customized setting values.
6	**GS (E *pL pH fn a***	6	Transmit the customized setting values.
7	**GS (E *pL pH fn a d1 d2***	7	Copy the user-defined page.
9	**GS (E *pL pH fn x c1 c2 [y d1...d(x × y)]k***	9	Define the data (raster format) for the character code page.
10	**GS (E *pL pH fn c1 c2***	10	Delete the data for the character code page.
11	**GS (E *pL pH fn a d1...dk***	11	Set the configuration item for the serial interface.
12	**GS (E *pL pH fn a***	12	Transmit the configuration item for the serial interface.
13	**GS (E *pL pH fn a d1...dk***	13	Set the configuration item for the Bluetooth interface.
14	**GS (E *pL pH fn a***	14	Transmit the configuration item for the Bluetooth interface.

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 1, 4, 6, 12, or 14> is transmitted, the data following must not be transmitted until the status is received. And, it will be necessary to perform the ESC/POS Handshaking Protocol procedures when using <Function 14>.

<Function 1> **GS (E *pL pH fn d1 d2*** (*fn* = 1)

[Name]	Change into the user setting mode								
[Format]	ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*
	Hex	1D	28	45	*pL*	*pH*	*fn*	*d1*	*d2*
	Decimal	29	40	69	*pL*	*pH*	*fn*	*d1*	*d2*

[Range] $(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$fn = 1$
$d1 = 73$
$d2 = 78$

[Description] • Enters the user setting mode and transmits the mode change notice.

<Function 2> **GS (E *pL pH fn d1 d2 d3*** (*fn* = 2)

[Name]	End the user setting mode session									
[Format]	ASCII	GS	(	E	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
	Hex	1D	28	45	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*
	Decimal	29	40	69	*pL*	*pH*	*fn*	*d1*	*d2*	*d3*

[Range] $(pL + pH \times 256) = 4$ $(pL = 4, pH = 0)$
$fn = 2$
$d1 = 79$
$d2 = 85$
$d3 = 84$

[Description] • Ends the user setting mode and performs a software reset.
- Clears the receive and print buffers.
- Resets all setting values in RAM (the print area, the character styles, and others) that were in effect at power on. (The data in the NV memory are not reset.)

<Function 3> **GS (E *pL pH fn [a1 b18...b11]...[ak bk8...bk1]*** (*fn* = 3)

[Name] Change the settings of the memory switch

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11] ... [ak bk8 ... bk1]*
Hex	1D	28	45	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11] ... [ak bk8 ... bk1]*
Decimal	29	40	69	*pL*	*pH*	*fn*	*[a1*	*b18 ... b11] ... [ak bk8 ... bk1]*

[Range] $10 \leq (pL + pH \times 256) \leq 65530$ $(0 \leq pL \leq 255, 0 \leq pH \leq 255)$
fn = 3
a = 8
$48 \leq b \leq 50$

[Default (upon shipment)]
[Msw 8-1] ~ [Msw8-5] are set to On (*b* = 49).

[Description]
- Changes the settings of the memory switch specified by *a* to the values specified by *b*.
  - When *b* = 48, the applicable bit is turned Off.
  - When *b* = 49, the applicable bit is turned On.
  - When *b* = 50, the applicable bit is not changed. Set *b* = 50 as the reserved bit.
- Memory switch 8 (Msw 8: *a* = 8)

Msw	Function	Setting value
8-1	Does not transmit the power On/Off notice and the battery status automatically.	48
	Transmits the power On/Off notice and the battery status automatically.	49
8-2	Does not beep the beeper when the battery remaining amount level becomes “L level“ and “S level“.	48
	Beeps the beeper when the battery remaining amount level becomes “L level“ and “S level“.	49
8-3	Does not beep the beeper when the host is disconnected.	48
	Beeps the beeper when the host is disconnected.	49
8-4	Does not beep the beeper at roll paper end.	48
	Beeps the beeper at roll paper end.	49
8-5	Does not beep the beeper when recoverable error or unrecoverable error occurs.	48
	Beeps the beeper when recoverable error or unrecoverable error occurs.	49
8-6 - 8-8	Reserved.	50

[Note]
- The memory switch 8 is not enabled **DLE DC4** (*fn*=7) and **ESC (A**.

<Function 4> **GS (E *pL pH fn a*** (*fn* = 4)

[Name] Transmit the settings of the memory switch

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$fn = 4$
$a = 8$

[Description] • Transmits the setting value of the memory switch specified by *a*.

<Function 5> **GS (E *pL pH fn [a1 n1L n1H]...[ak nkL nkH]*** (*fn* = 5)

[Name] Set the customized setting values

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ...*	*[ak*	*nkL*	*nkH]*
Hex	1D	28	45	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ...*	*[ak*	*nkL*	*nkH]*
Decimal	29	40	69	*pL*	*pH*	*fn*	*[a1*	*n1L*	*n1H] ...*	*[ak*	*nkL*	*nkH]*

[Range] $4 \le (pL + pH \times 256) \le 65533$ $(0 \le pL \le 255, 0 \le pH \le 255)$
$fn = 5$
$a = 3, 5, 116$
$(nL + nH \times 256) = 2, 3$ $(nL = 2,3, nH = 0)$ [when $a = 3$]
$0 \le (nL + nH \times 256) \le 6, 65530 \le (nL + nH \times 256) \le 65535$
$(0 \le nL \le 6, nH = 0,$ $250 \le nL \le 255, nH = 255)$ [when $a = 5$]
$0 \le (nL + nH \times 256) \le 60$ $(0 \le nL \le 60, nH = 0)$ [when $a = 116$]

[Default (upon shipment)]
$(nL + nH \times 256) = 2$ $(nL = 2, nH = 0)$ [when $a = 3$]
$(nL + nH \times 256) = 0$ $(nL = 0, nH = 0)$ [when $a = 5$]
$(nL + nH \times 256) = 20$ $(nL = 20, nH = 0)$ [when $a = 116$]

[Description] • Sets the customized value specified by *a* to the values specified by $(nL + nH \times 256)$.

a	Type of customized value
3	Width of roll paper
5	Print density
116	Auto power-off time

• Width of roll paper setting ($a = 3$)

$(nL + nH \times 256)$	Roll paper width
2	58 mm
3	60 mm

- Print density setting (a = 5)

(nL + $nH \times 256$)	Print density	
65530	70 %	light
65531	75 %	|
65532	80 %	|
65533	85 %	|
65534	90 %	|
65535	95 %	|
0	100 %	|
1	105 %	|
2	110 %	|
3	115 %	|
4	120 %	|
5	125 %	|
6	130 %	dark

- Auto power-off time (a=116)

(nL + $nH \times 256$)	Auto power-off time
0	Does not auto power off.
1	1 minute
2	2 minutes
|	|
60	60 minutes

<Function 6> **GS (E *pL pH fn a*** (*fn* = 6)

[Name] Transmit the customized setting values

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 6
a = 3, 5, 116

[Description] • Transmits the customized value specified by *a*.

a	Type of customized value
3	Width of roll paper
5	Print density
116	Auto power-off time

<Function 7> **GS (E *pL pH fn a d1 d2*** (*fn* = 7)

[Name] Copy the user-defined page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*	*d1*	*d2*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*	*d1*	*d2*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*	*d1*	*d2*

[Range] ($pL + pH \times 256$) = 4 (pL = 4, pH = 0)
fn = 7
a = 12, 17, 18
d1 = 30, 31
d2 = 30, 31 [where $d1 \neq d2$]

[Description]

- Copies the data in the user-defined code page.
- *a* specifies the font no.

(*a*) Font No.	Font Type	Code Page	Data Configuration: Dots in Horizontal Direction	Data Configuration: Dots in Vertical Direction
12	12 × 24	Font A: Page 255	12	24
17	8 × 16	Font C: Page 255	8	16
18	10 × 24	Font B: Page 255	10	24

- Copy operation is specified by *d1* and *d2*.

d1	*d2*	Function
31	30	Loads the character code page data for font no. (*a*) from the storage area (Flash ROM) to the work area (RAM).
30	31	Saves the character code page data in the work area (RAM) to the storage area (Flash ROM) specified by font no. (*a*).

<Function 9> **GS (E *pL pH fn x c1 c2 [y d1...d(x × y)]k*** (*fn* = 9)

[Name] Define the data (raster format) for the character code page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y d1...d(x × y)]k*
Hex	1D	28	45	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y d1...d(x × y)]k*
Decimal	29	40	69	*pL*	*pH*	*fn*	*x*	*c1*	*c2*	*[y d1...d(x × y)]k*

[Range]
$5 \le (pL + pH \times 256) \le 65535$ $(0 \le pL \le 255, 0 \le pH \le 255)$
$fn = 9$
$x = 2$ [when Font A or Font B is selected]
$x = 1$ [when Font C is selected]
$128 \le c1 \le c2 \le 255$
$0 \le y \le 24$ [when Font A or Font B is selected]
$0 \le y \le 16$ [when Font C is selected]
$0 \le d \le 255$
$k = c2 - c1 + 1$

[Description]
- Defines the character pattern (raster format) for the character code page in the work area (RAM).
  - *x* specifies the number of bytes in the horizontal direction.
  - *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.
  - *y* specifies the number of dots in the vertical direction.
  - *d* specifies the defined data (raster format).

<Function 10> **GS (E *pL pH fn c1 c2*** (*fn* = 10)

[Name] Delete the data for the character code page

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*c1*	*c2*
Hex	1D	28	45	*pL*	*pH*	*fn*	*c1*	*c2*
Decimal	29	40	69	*pL*	*pH*	*fn*	*c1*	*c2*

[Range]
$(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$
$fn = 10$
$128 \le c1 \le c2 \le 255$

[Description]
- Deletes the character pattern for the character code page in the work area (RAM).
  - *c1* specifies the beginning character code for the deletion, and *c2* specifies the final code.

<Function 11> **GS (E *pL pH fn a d1...dk*** (*fn* = 11)

[Name] Set the configuration item for the serial interface

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*	*d1 ... dk*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*	*d1 ... dk*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*	*d1 ... dk*

[Range]
$3 \leq (pL + pH \times 256) \leq 65535$ $(0 \leq pL \leq 255, 0 \leq pH \leq 255)$ [when *a* = 1]
$(pL + pH \times 256) = 3$ $(pL = 3, pH = 0)$ [when *a* = 2]
fn = 11
a = 1, 2
$48 \leq d \leq 57$ [when *a* = 1]
$48 \leq d \leq 50$ [when *a* = 2]

[Default (upon shipment)]
19200 bps, no parity
d1...dk = “19200” [when *a* = 1]
d1 = 48 [when *a* = 2]

[Description]
- Sets the configuration item for the serial interface specified by *a* to the values specified by *d*.

a	Configuration item
1	Transmission speed
2	Parity

- Transmission speed setting (*a* = 1)

d1...dk	Transmission speed
“9600”	9600 bps
“19200”	19200 bps
“38400”	38400 bps

- Parity setting (*a* = 2)

d1	Parity
48	No parity
49	Odd parity
50	Even parity

[Note]
- The configuration item set by this function is enabled by executing **GS (E** <Function 2> or restarting the printer.
  Note that the configuration of the host computer must be the same as the configuration of the printer.

<Function 12> **GS (E *pL pH fn a*** (*fn* = 12)

[Name]	Transmit the configuration item for the serial interface						
[Format]	ASCII	GS	(	E	*pL* *pH*	*fn*	*a*
	Hex	1D	28	45	*pL* *pH*	*fn*	*a*
	Decimal	29	40	69	*pL* *pH*	*fn*	*a*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
fn = 12
a = 1, 2

[Description] • Transmits the configuration item for the serial interface specified by *a*.

a	Configuration item
1	Transmission speed
2	Parity

<Function 13> **GS (E *pL pH fn a d1...dk*** (*fn* = 13)

[Name]	Set the configuration item for the Bluetooth interface							
[Format]	ASCII	GS	(	E	*pL* *pH*	*fn*	*a*	*d1 ... dk*
	Hex	1D	28	45	*pL* *pH*	*fn*	*a*	*d1 ... dk*
	Decimal	29	40	69	*pL* *pH*	*fn*	*a*	*d1 ... dk*

[Range] $6 \leq (pL + pH \times 256) \leq 18$ $(6 \leq pL \leq 18, pH = 0)$ [when *a*=49]
$3 \leq (pL + pH \times 256) \leq 66$ $(3 \leq pL \leq 66, pH = 0)$ [when *a*=65]
fn = 13
a = 49, 65
$32 \leq d \leq 255$
$4 \leq k \leq 16$ [when *a*=49]
$1 \leq k \leq 64$ [when *a*=65]

[Default (upon shipment)]
d1...dk = “4254” [when *a* = 49]
d1...dk = “TAIYO SPP” [when *a* = 65]

[Description] • Sets the configuration item for the Bluetooth interface specified by *a* to the values specified by *d*.

a	Configuration item
49	Bluetooth passkey
65	Bluetooth device name

[Notes]
• This function is enabled with a Bluetooth interface model.
• The configuration item set by this function is enabled by executing **GS (E** <Function 2>.
Note that the configuration of the host computer must be the same as the configuration of the printer.

<Function 14> **GS (E *pL pH fn a*** (*fn* = 14)

[Name] Transmit the configuration item for the Bluetooth interface

[Format]

ASCII	GS	(	E	*pL*	*pH*	*fn*	*a*
Hex	1D	28	45	*pL*	*pH*	*fn*	*a*
Decimal	29	40	69	*pL*	*pH*	*fn*	*a*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
fn = 14
a = 48, 49, 65

[Description] • Transmits the configuration item for the Bluetooth interface specified by *a*.

a	Configuration item
48	Bluetooth device address (BD_ADDR)
49	Bluetooth passkey
65	Bluetooth device name

[Note] • This function is enabled with a Bluetooth interface model.

GS (H *pL pH fn [parameters]*

[Name] Request transmission of response

[Description] • Various processes are performed for the response
- *pL*, *pH* specify $(pL + pH \times 256)$ as the number of bytes after *pH* (*fn* and *[parameters]*).
- *fn* specifies the function.
- *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**GS (H *pL pH fn m d1 d2 d3 d4***	48	Set the process ID response.

[Note] • Do not use this command in a system that uses the printer with the OPOS driver or the JavaPOS driver provided by Seiko Epson Corporation.

<Function 48> **GS (H *pL pH fn m d1 d2 d3 d4*** (*fn* = 48)

[Name] Set the process ID response

[Format]

ASCII	GS	(	H	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*
Hex	1D	28	48	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*
Decimal	29	40	72	*pL*	*pH*	*fn*	*m*	*d1*	*d2*	*d3*	*d4*

[Range] $(pL + pH \times 256) = 6$ $(pL = 6, pH = 0)$
fn = 48
m = 48
$32 \le d \le 126$

[Description] • Saves the process ID specified by (*d1*, *d2*, *d3*, *d4*) for the data processed just before this function.

GS (K *pL pH fn [parameters]*

[Name] Select print control method(s)

[Description]
- Selects the print control methods.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**GS (K *pL pH fn m***	48	Select the print control mode.

<Function 48> **GS (K *pL pH fn m*** (*fn* = 48)

[Name] Select the print control mode

[Format]

ASCII	GS	(	K	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4B	*pL*	*pH*	*fn*	*m*
Decimal	29	40	75	*pL*	*pH*	*fn*	*m*

[Range] (*pL* + *pH* × 256) = 2 (*pL* = 2, *pH* = 0)
fn = 48
m = 49, 50

[Default] *m* = 49

[Description]
- Selects the print control mode.

m	Print control mode
49	High speed
50	Fine

[Note]
- In page mode, the printer prints ladder bar code and the lines contained in that ladder bar code in “Fine“ print control mode regardless of the setting of this function.

Confidential

GS (L *pL pH m fn [parameters]*

[Name] Set graphics data

[Description]
- Processes graphics data.
  - *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*m*, *fn*, and *[parameters]*).
  - *fn* specifies the function.
  - *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
0, 48	**GS (L *pL pH m fn***	48	Transmit the NV graphics memory capacity.
2, 50	**GS (L *pL pH m fn***	50	Print the graphics data in the print buffer.
3, 51	**GS (L *pL pH m fn***	51	Transmit the remaining capacity of the NV graphics memory.
64	**GS (L *pL pH m fn d1 d2***	64	Transmit the key code list for defined NV graphics.
65	**GS (L *pL pH m fn d1 d2 d3***	65	Delete all NV graphics data.
66	**GS (L *pL pH m fn kc1 kc2***	66	Delete the specified NV graphics data.
67	**GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1... [c d1...dk]b***	67	Define the NV graphics data (raster format).
69	**GS (L *pL pH m fn a kc1 kc2 b x y***	69	Print the specified NV graphics data.
112	**GS (L *pL pH m fn a bx by c xL xH yL yH d1...dk***	112	Store the graphics data in the print buffer (raster format).

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.
- When <Function 48, 51, or 64> is transmitted, the data following must not be transmitted until the status is received. And, it will be necessary to perform the ESC/POS Handshaking Protocol procedures when using <Function 64>.
- The number of items registered in the NV user memory or NV graphics must be 50 or fewer to keep the execution time of <Function 67> **GS (L** short enough. The execution time is 80 seconds or less when the number of items registered is 50 or fewer.
  - The execution time for 50 items is 80 seconds or fewer.
  - The execution time for 100 items is 160 seconds or fewer.”

<Function 48> **GS (L *pL pH m fn*** (*fn* = 0, 48)

[Name]	Transmit the NV graphics memory capacity							
[Format]	ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
	Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
	Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$m = 48$
$fn = 0, 48$

[Description]
- Transmits the entire capacity of the NV graphics area (number of bytes in the NV graphics area).

<Function 50> **GS (L *pL pH m fn*** (*fn* = 2, 50)

[Name]	Print the graphics data in the print buffer							
[Format]	ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
	Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
	Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$m = 48$
$fn = 2, 50$

[Description]
- Prints the buffered graphics data stored by the process of **GS (L** <Function 112>.

<Function 51> **GS (L *pL pH m fn*** (*fn* = 3, 51)

[Name]	Transmit the remaining capacity of the NV graphics memory							
[Format]	ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*
	Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*
	Decimal	29	40	76	*pL*	*pH*	*m*	*fn*

[Range] $(pL + pH \times 256) = 2$ $(pL = 2, pH = 0)$
$m = 48$
$fn = 3, 51$

[Description]
- Transmits the number of bytes of remaining memory (unused area) in the NV graphics area.

<Function 64> **GS (L *pL pH m fn d1 d2*** (*fn* = 64)

[Name] Transmit the key code list for defined NV graphics

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*

[Range]
$(pL + pH \times 256) = 4$ $(pL = 4, pH = 0)$
m = 48
fn = 64
d1 = 75
d2 = 67

[Description]
- Transmits the defined NV graphics key code list.

<Function 65> **GS (L *pL pH m fn d1 d2 d3*** (*fn* = 65)

[Name] Delete all NV graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*d1*	*d2*	*d3*

[Range]
$(pL + pH \times 256) = 5$ $(pL = 5, pH = 0)$
m = 48
fn = 65
d1 = 67
d2 = 76
d3 = 82

[Description]
- Deletes all NV graphics data.

<Function 66> **GS (L *pL pH m fn kc1 kc2*** (*fn* = 66)

[Name] Delete the specified NV graphics data

[Format]

ASCII	GS	(	L	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
Hex	1D	28	4C	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*
Decimal	29	40	76	*pL*	*pH*	*m*	*fn*	*kc1*	*kc2*

[Range]
$(pL + pH \times 256) = 4$ $(pL = 4, pH = 0)$
m = 48
fn = 66
$32 \leq kc1 \leq 126$
$32 \leq kc2 \leq 126$

[Description]
- Deletes the NV graphics data defined by the key codes (*kc1* and *kc2*).

<Function 67>

GS (L *pL pH m fn a kc1 kc2 b xL xH yL yH [c d1…dk]1…[c d1....dk]b* (*fn* = 67)

[Name] Define the NV graphics data (raster format)

[Format]

ASCII	GS	(	L	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*
Hex	1D	28	4C	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*
Decimal	29	40	76	*pL pH m fn a kc1 kc2 b xL xH yL yH [c d1...dk]1...[c d1...dk]b*

[Range]
$12 \le (pL + pH \times 256) \le 65535$ ($0 \le pL \le 255$, $0 \le pH \le 255$)
$m = 48$
$fn = 67$
$a = 48$
$32 \le kc1 \le 126$
$32 \le kc2 \le 126$
$b = 1$
$1 \le (xL + xH \times 256) \le 1024$ ($0 \le xL \le 255$, $0 \le xH \le 4$)
$1 \le (yL + yH \times 256) \le 1200$ ($0 \le yL \le 255$, $0 \le yH \le 4$)
$c = 49$
$0 \le d \le 255$
$k = (\text{int}((xL + xH \times 256) + 7) / 8) \times (yL + yH \times 256)$
The entire capacity size = 384KB.
(Uses the same area in the NV user memory.)

[Description]
- Defines the NV graphics data (raster format) as a record specified by the key codes (*kc1*, *kc2*) in the NV graphics area.
- *xL*, *xH* specify the number of dots in the horizontal direction as ($xL + xH \times 256$).
- *yL*, *yH* specify the number of dots in the vertical direction as ($yL + yH \times 256$).
- *d* specifies the defined data (raster format).

[Notes]
- In cases where there is insufficient capacity available for storing NV graphics data specified by ($xL + xH \times 256$) and ($yL + yH \times 256$), this function is ignored.
- The [data value (*k*) + control information data value (see below table)] area of the NV graphics data domain is used when this function is executed.

Condition	Control information data value
If data value (*k*) is odd number	32 bytes
If data value (*k*) is even number	33 bytes

<Function 69> **GS (L *p_L p_H m fn kc1 kc2 x y*** (*fn* = 69)

[Name] Print the specified NV graphics data

[Format]

ASCII	GS	(	L	*p_L p_H m fn kc1 kc2 x y*
Hex	1D	28	4C	*p_L p_H m fn kc1 kc2 x y*
Decimal	29	40	76	*p_L p_H m fn kc1 kc2 x y*

[Range]
$(p_L + p_H \times 256) = 6$ $(p_L = 6, p_H = 0)$
$m = 48$
$fn = 69$
$32 \leq kc1 \leq 126$
$32 \leq kc2 \leq 126$
$x = 1, 2$
$y = 1, 2$

[Description]
- Prints the NV graphics data defined by the key codes (*kc1* and *kc2*).
- The graphics data is enlarged by *x* and *y* in the horizontal and vertical directions.

x, *y*	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	203/2 dpi	203/2 dpi

<Function 112> **GS (L *p_L p_H m fn a bx by c x_L x_H y_L y_H d1...dk*** (*fn* = 112)

[Name] Store the graphics data in the print buffer (raster format)

[Format]

ASCII	GS	(	L	*p_L p_H m fn a bx by c x_L x_H y_L y_H d1...dk*
Hex	1D	28	4C	*p_L p_H m fn a bx by c x_L x_H y_L y_H d1...dk*
Decimal	29	40	76	*p_L p_H m fn a bx by c x_L x_H y_L y_H d1...dk*

[Range]
$11 \leq (p_L + p_H \times 256) \leq 65535$ $(0 \leq p_L \leq 255, 0 \leq p_H \leq 255)$
$m = 48$
$fn = 112$
$a = 48$
$bx = 1, 2$
$by = 1, 2$
$c = 49$
$1 \leq (x_L + x_H \times 256) \leq 1024$ $(0 \leq x_L \leq 255, 0 \leq x_H \leq 4)$
$1 \leq (y_L + y_H \times 256) \leq 1200$ $(0 \leq y_L \leq 255, 0 \leq y_H \leq 4)$ [when *by*=1]
$1 \leq (y_L + y_H \times 256) \leq 600$ $(0 \leq y_L \leq 255, 0 \leq y_H \leq 2)$ [when *by*=2]
$0 \leq d \leq 255$
$k = (\text{int}((x_L + x_H \times 256) + 7) / 8) \times (y_L + y_H \times 256)$

[Description]
- Stores the graphics data (raster format) in the print buffer.
- The graphics data is enlarged by *bx* and *by* in the horizontal and vertical directions.

bx, *by*	Vertical direction	Horizontal direction
1	203 dpi	203 dpi
2	203/2 dpi	203/2 dpi

- x_L, x_H specify the number of dots in the horizontal direction as $(x_L + x_H \times 256)$.
- y_L, y_H specify the number of dots in the vertical direction as $(y_L + y_H \times 256)$.
- *d* specifies the stored data (raster format).

GS (M *pL pH fn m*

[Name] Customize printer control value(s)

[Description]
- Customizes the printer control value(s).
- *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *m*).
- *fn* specifies the function.
- *m* specifies the process of each function.

fn	Format	Function No.	Function name
1, 49	**GS (M *pL pH fn m***	1	Save the setting values from the work area into the storage area.
2, 50	**GS (M *pL pH fn m***	2	Load the setting values stored in the storage area to the work area.
3, 51	**GS (M *pL pH fn m***	3	Select the setting values loaded to the work area after the initialization process.

- Applied setting values for this command

Setting value	Command
Status	**GS a**
Characters	**ESC SP**, **ESC –**, **ESC E**, **ESC M**, **ESC R**, **ESC t**, **ESC {**, **GS !**, **GS B**, **GS b**
Line spacing	**ESC 3**
Print position	**ESC D**, **ESC T**, **ESC a**, **GS L**, **GS W**
Bar code	**GS H**, **GS f**, **GS h**, **GS w**
Other characteristics	**ESC c 5**, **GS (D**, **GS (K** <Function 48>

[Notes]
- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands, while the printer is BUSY.

<Function 1> **GS (M *pL pH fn m*** (*fn* = 1,49)

[Name]	Save the setting values from the work area into the storage area
[Format]	ASCII GS (M *pL pH fn m* Hex 1D 28 4D *pL pH fn m* Decimal 29 40 77 *pL pH fn m*
[Range]	($pL + pH \times 256$) = 2 (pL = 2, pH = 0) *fn* = 1, 49 *m* = 1, 49
[Description]	• Saves the setting values of commands listed in the table on the previous page and stored in the work area (RAM) in the storage area (Flash ROM).

<Function 2> **GS (M *pL pH fn m*** (*fn* = 2,50)

[Name]	Load the setting values stored in the storage area to the work area
[Format]	ASCII GS (M *pL pH fn m* Hex 1D 28 4D *pL pH fn m* Decimal 29 40 77 *pL pH fn m*
[Range]	($pL + pH \times 256$) = 2 (pL = 2, pH = 0) *fn* = 2, 50 *m* = 0, 1, 48, 49
[Description]	• Loads the command setting values stored in storage area specified by *m* to the work area.

m	Function
0, 48	The default values described in this specification are applied.
1, 49	The setting values are stored in the storage area.

[Note] • Values not listed among the above commands are not affected.

<Function 3> **GS (M *pL pH fn m*** (*fn* = 3,51)

[Name] Select the setting values loaded to the work area after the initialization process

[Format]

ASCII	GS	(	M	*pL*	*pH*	*fn*	*m*
Hex	1D	28	4D	*pL*	*pH*	*fn*	*m*
Decimal	29	40	77	*pL*	*pH*	*fn*	*m*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 3, 51
m = 0, 1, 48, 49

[Default (upon shipment)]
m = 0

[Description]
- Selects the command setting values loaded to the work area after the printer performs the initialization process.

m	Function
0, 48	The default values described in this specification are applied.
1, 49	The setting values are stored in the storage area.

[Note]
- For values not listed among the above commands, the default values described in this specification are applied.

GS B *n*

[Name] Turn white/black reverse print mode on/off

[Format]

ASCII	GS	B	*n*
Hex	1D	42	*n*
Decimal	29	66	*n*

[Range] $0 \le n \le 255$

[Default] *n* = 0

[Description]
- Turns white/black reverse print mode on or off.
  - When the LSB of *n* is 0, white/black reverse mode is turned off.
  - When the LSB of, *n* is 1, white/black reverse mode is turned on.

GS H *n*

[Name] Select print position of HRI characters

[Format]

ASCII	GS	H	*n*
Hex	1D	48	*n*
Decimal	29	72	*n*

[Range] $0 \leq n \leq 3$, $48 \leq n \leq 51$

[Default] $n = 0$

[Description] • Selects the print position of HRI characters when printing a bar code.

n	Print position
0, 48	Not printed.
1, 49	Above the bar code.
2, 50	Below the bar code.
3, 51	Both above and below the bar code.

GS I *n*

[Name] Transmit printer ID

[Format]

ASCII	GS	I	*n*
Hex	1D	49	*n*
Decimal	29	73	*n*

[Range] $n = 1, 2, 49, 50$ [the printer ID]
$n = 33, 96$ [printer information A]
$65 \leq n \leq 69$ [printer information B]

[Description] • Transmits the printer ID or printer information.

• Transmits the printer ID specified.

n	Type of printer ID	ID
1, 49	Printer model ID	Hexadecimal: 4A / Decimal: 74
2, 50	Type ID	See table [Type ID].

[Type ID]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Multi-byte code characters not supported.
1	On	02	2	Autocutter installed.
2	Off	00	0	DM-D series customer display not connected.
3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

- Transmits the printer information A specified.

n	Type of printer information	Contents
33	Type information	See table [Type information].
96	DIP switches information	See table [DIP switch information].

The type information is the tow bytes that follow:

[Type information (First byte)]

Bit	Off/On	Hex	Decimal	Contents
0	Off	00	0	Multi-byte code characters not supported.
1	On	02	2	Autocutter installed.
2	Off	00	0	DM-D series customer display not connected.
3 - 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[Type information (Second byte)]

Bit	Off/On	Hex	Decimal	Contents
0 - 5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

[DIP switch information]

Bit	Off/On	Hex	Decimal	Contents
0	--	--	--	Reserved.
1	Off	00	0	DIP SW 1-2: Off
	On	02	2	DIP SW 1-2: On
2, 3	--	--	--	Reserved.
4	Off	00	0	DIP SW 2: Off
	On	10	16	DIP SW 2: On
5	--	--	--	Reserved.
6	On	40	64	Fixed.
7	Off	00	0	Fixed.

- Transmits the printer information B specified.

n	Type of printer information	Contents
65	Firmware version	Depends on firmware version.
66	Manufacturer	“EPSON”
67	Printer name	“TM-P60”
68	Product ID	Serial number.
69	Type of mounted additional fonts	Japanese model: “KANJI JAPANESE”
		Traditional Chinese model: “TAIWAN BIG-5”

[Note]
- When this command is transmitted, the data following must not be transmitted until the status is received.

GS L *nL nH*

[Name]	Set left margin
[Format]	ASCII GS L n_L n_H Hex 1D 4C n_L n_H Decimal 29 76 n_L n_H
[Range]	$0 \leq (n_L + n_H \times 256) \leq 65535$ $(0 \leq n_L \leq 255, 0 \leq n_H \leq 255)$
[Default]	$(n_L + n_H \times 256) = 0$ $(n_L = 0, n_H = 0)$
[Description]	• In standard mode, sets the left margin to $[(n_L + n_H \times 256) \times$ (horizontal motion unit)].

<A> GS V *m*
<B> GS V *m n*

[Name]	Select cut mode and cut paper
[Format]	<A> ASCII GS V *m* Hex 1D 56 *m* Decimal 29 86 *m* <B> ASCII GS V *m n* Hex 1D 56 *m n* Decimal 29 86 *m n*
[Range]	<A> *m* = 0, 1, 48, 49 <B> *m* = 65, 66, $0 \leq n \leq 255$
[Description]	• Executes paper cutting specified by *m*.

m		Function
<A>	0, 48 1, 49	Cuts paper.
<B>	65, 66	Feeds paper to (cutting position + [$n \times$ (vertical motion unit)]) and cuts the paper.

[Note] • This printer executes a partial cut (one point left uncut).

GS W n_L n_H

[Name]	Set print area width				
[Format]	ASCII	GS	W	n_L	n_H
	Hex	1D	57	n_L	n_H
	Decimal	29	87	n_L	n_H

[Range] $0 \leq (n_L + n_H \times 256) \leq 65535$ $(0 \leq n_L \leq 255, 0 \leq n_H \leq 255)$

[Default] $(n_L + n_H \times 256) = 420$ $(n_L = 164, n_H = 1)$ [when 58 mm paper width is selected]
$(n_L + n_H \times 256) = 432$ $(n_L = 176, n_H = 1)$ [when 60 mm paper width is selected]

[Description]
- In standard mode, sets the print area width to [$(n_L + n_H \times 256) \times$ (horizontal motion unit)].

GS \ n_L n_H

[Name]	Set relative vertical print position in page mode				
[Format]	ASCII	GS	\	n_L	n_H
	Hex	1D	5C	n_L	n_H
	Decimal	29	92	n_L	n_H

[Range] $-32768 \leq (n_L + n_H \times 256) \leq 32767$

[Description]
- In page mode, moves the vertical print position to [$(n_L + n_H \times 256) \times$ (vertical or horizontal motion unit)] from the current position.
- A positive number specifies downward movement, and a negative number specifies upward movement.

GS a *n*

[Name] Enable/disable Automatic Status Back (ASB)

[Format]

ASCII	GS	a	*n*
Hex	1D	61	*n*
Decimal	29	97	*n*

[Range] $0 \le n \le 255$

[Default] $n = 255$

[Description]
- Enables or disables basic ASB (Automatic Status Back).

(*n*) Bit	Off/On	Hex	Decimal	Function
0	On	01	1	Reserved.
1	Off	00	0	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Roll paper sensor status disabled.
	On	08	8	Roll paper sensor status enabled.
4, 5	On	30	48	Reserved.
6	Off	00	0	Panel button status disabled.
	On	40	64	Panel button status enabled.
7	On	80	128	Reserved.

- While basic ASB is active, the selected enabled basic ASB status is transmitted whenever the status changes.

- The basic ASB status to be transmitted is the four bytes that follow:
  - First byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0, 1	Off	00	0	Fixed.
2	Off	00	0	Does not go offline by low battery.
	On	04	4	Offline by low battery.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Fixed.
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed by the paper FEED button.
	On	40	64	Paper is being fed by the paper FEED button.
7	Off	00	0	Fixed.

• Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status
0	--	--	--	Reserved.
1	Off	00	0	Paper FEED button is turned off.
	On	02	2	Paper FEED button is turned on.
2	--	--	--	Reserved.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	Off	00	0	Fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Fixed.

• Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0, 1	--	--	--	Reserved.
2, 3	Off	00	0	Roll paper end sensor: paper present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the roll cover is opening, this shows the state when the cover was still closed.

• Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status
0 - 3	--	--	--	Reserved.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

GS b *n*

[Name] Turn smoothing mode on/off

[Format]

ASCII	GS	b	*n*
Hex	1D	62	*n*
Decimal	29	98	*n*

[Range] $0 \le n \le 255$

[Default] $n = 0$

[Description] • Turns smoothing mode on or off.
- When the LSB of *n* is 0, smoothing mode is turned off.
- When the LSB of *n* is 1, smoothing mode is turned on.

GS f *n*

[Name] Select font for HRI characters

[Format]

ASCII	GS	f	*n*
Hex	1D	66	*n*
Decimal	29	102	*n*

[Range] $0 \le n \le 2$, $48 \le n \le 50$

[Default] $n = 0$

[Description] • Selects a font for the HRI characters when printing a bar code.

n	Font for the HRI characters
0, 48	Character font A (12 × 24)
1, 49	Character font B (10 × 24)
2, 50	Character font C (8 × 16)

GS g 0 *m nL nH*

[Name] Initialize maintenance counter

[Format]

ASCII	GS	g	0	*m*	*nL*	*nH*
Hex	1D	67	30	*m*	*nL*	*nH*
Decimal	29	103	48	*m*	*nL*	*nH*

[Range] $m = 0$

$(nL + nH \times 256) = 20, 21, 50, 70$ $(nL = 20, 21, 50, 70, nH = 0)$

[Description] • Sets the resettable maintenance counter specified by $(nL + nH \times 256)$ to 0.

(*nL* + *nH* × 256)		Maintenance counter [Units]
Hex	Decimal	
14	20	Number of line feeds. [Lines]
15	21	Number of times head is energized. [Times]
32	50	Number of autocutter operations. [Times].
46	70	Printer operation time. [Hours].

[Notes]

- Frequent write command executions by an NV memory write command may damage the NV memory. Therefore, it is recommended to write to the NV memory less than 10 times a day.
- If the power is turned off or the printer is reset via an interface while this command is being executed, the printer may go into an abnormal condition. Be careful not to turn the power off or let the printer be reset via an interface while this command is being executed.
- While processing this command, the printer is BUSY while writing the data to the NV memory and stops receiving data. Therefore, be sure not to transmit data, including the real-time commands while the printer is BUSY.

GS g 2 *m nL nH*

[Name] Transmit maintenance counter

[Format]

ASCII	GS	g	2	*m*	n_L	n_H
Hex	1D	67	32	*m*	n_L	n_H
Decimal	29	103	50	*m*	n_L	n_H

[Range] $m = 0$
($n_L + n_H \times 256$) = 20, 21, 50, 70 (n_L = 20, 21, 50, 70, $n_H = 0$)
($n_L + n_H \times 256$) = 148, 149, 178, 198 (n_L = 148, 149, 178, 198, $n_H = 0$)

[Description] • Transmits the value of the maintenance counter specified by ($n_L + n_H \times 256$).

($n_L + n_H \times 256$)			
Hex	Decimal	Maintenance counter [Units]	Kind of counter
14	20	Number of line feeds. [Lines]	Resettable (can be reset)
15	21	Number of times head is energized. [Times]	
32	50	Number of autocutter operations. [Times].	
46	70	Printer operation time. [Hours].	
94	148	Number of line feeds. [Lines]	Cumulative
95	149	Number of times head is energized. [Times]	
B2	178	Number of autocutter operations. [Times].	
C6	198	Printer operation time. [Hours].	

[Notes]
- The maintenance counter values are measurements; therefore, their values will be affected by the timing of errors and how and when the power is turned off.
- When this command is transmitted, the data following must not be transmitted until the status is received.

GS h *n*

[Name] Set bar code height

[Format]

ASCII	GS	h	*n*
Hex	1D	68	*n*
Decimal	29	104	*n*

[Range] $1 \leq n \leq 255$

[Default] $n = 162$

[Description] • Sets the height of the bar code to *n* dots.

<A> GS k *m d1...dk NUL*
<B> GS k *m n d1...dn*

[Name] Print bar code

[Format]

<A>	ASCII	GS	k	*m*	*d1...dk*	*NUL*	
	Hex	1D	6B	*m*	*d1...dk*	*00*	
	Decimal	29	107	*m*	*d1...dk*	*0*	
<B>	ASCII	GS	k	*m*	*n*	*d1...dn*	
	Hex	1D	6B	*m*	*n*	*d1...dn*	
	Decimal	29	107	*m*	*n*	*d1...dn*	

[Range] <A> $0 \le m \le 6$ (*k* and *d* see [Description])
<B> $65 \le m \le 73$ (*n* and *d* see [Description])

[Description]
- Prints the bar code using the bar code system specified by *m*.

For <Function A>

m	Bar code system	Range of *k*	Range of *d*
0	UPC-A	*k* = 11, 12	$48 \le d \le 57$
1	UPC-E	*k* = 11, 12	$48 \le d \le 57$ [where *d1* = 48]
2	JAN13 / EAN13	*k* = 12, 13	$48 \le d \le 57$
3	JAN8 / EAN8	*k* = 7, 8	$48 \le d \le 57$
4	CODE39	$1 \le k$	$48 \le d \le 57$, $65 \le d \le 90$, *d* = 32,36,37,42,43,45,46,47
5	ITF	$2 \le k$ (even number)	$48 \le d \le 57$
6	CODABAR (NW-7)	$2 \le k$	$48 \le d \le 57$, $65 \le d \le 68$, $97 \le d \le 100$, *d* = 36,43,45,46,47,58 [where $65 \le d1 \le 68$, $65 \le dk \le 68$, $97 \le d1 \le 100$, $97 \le dk \le 100$]

- *k* of <Function A> is used to indicate the number of bytes of bar code data.
- *d* specifies the bar code data.

For <Function B>

m	Bar code system	Range of *n*	Range of *d*
65	UPC-A	n = 11, 12	$48 \le d \le 57$
66	UPC-E	n = 11, 12	$48 \le d \le 57$ [where $d1 = 48$]
67	JAN13 / EAN13	n = 12, 13	$48 \le d \le 57$
68	JAN8 / EAN8	n = 7, 8	$48 \le d \le 57$
69	CODE39	$1 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 90$, d = 32,36,37,42, 43,45,46,47
70	ITF	$2 \le n \le 254$ (even number)	$48 \le d \le 57$
71	CODABAR (NW-7)	$2 \le n \le 255$	$48 \le d \le 57$, $65 \le d \le 68$, $97 \le d \le 100$, d = 36,43,45,46,47,58 [where $65 \le d1 \le 68$, $65 \le dn \le 68$, $97 \le d1 \le 100$, $97 \le dn \le 100$]
72	CODE93	$1 \le n \le 255$	$0 \le d \le 127$
73	CODE128	$2 \le n \le 255$	$0 \le d \le 127$ [where $d1 = 123$, $65 \le d2 \le 67$]

- *n* of <Function B> specifies the number of bytes of bar code data.
- *d* specifies the bar code data.

[Note]
- Consider that a quiet zone (left or right side space area, depending on the bar code specifications) must be ensured for bar code printing.

GS r *n*

[Name] Transmit status

[Format]

ASCII	GS	r	*n*
Hex	1D	72	*n*
Decimal	29	114	*n*

[Range] *n* = 1, 49

[Description]
- Transmits the status.

n	Function
1, 49	Transmits paper sensor status.

- This printer transmits the following status.
  - Paper sensor status (*n* = 1, 49)

Bit	Off/On	Hex	Decimal	Status
0, 1	--	--	--	Reserved.
2, 3	Off	00	0	Roll paper end sensor: paper present.
	On	0C	12	Roll paper end sensor: paper not present.
4	Off	00	0	Fixed.
5, 6	--	--	--	Reserved.
7	Off	00	0	Fixed.

Bits 2 and 3: While the roll cover is opening, this shows the state when the roll cover was still closed (this command cannot be executed).

[Note]
- When this command is transmitted, the data following must not be transmitted until this status is received.

GS w *n*

[Name] Set bar code width

[Format]

ASCII	GS	w	*n*
Hex	1D	77	*n*
Decimal	29	119	*n*

[Range] $2 \leq n \leq 6$

[Default] $n = 3$

[Description]
- Sets the horizontal size of the bar code.

	Multi-level bar code	Binary-level bar code	
n	Module width (mm)	Thin element width (mm)	Thick element width (mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.500	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

- Multi-level bar codes are as follows:
  UPC-A, UPC-E, JAN13 / EAN13, JAN8 / EAN8, CODE93, and CODE128
- Binary-level bar codes are as follows:
  CODE39, ITF, and CODABAR

6.4 Commands of Multi-byte Code Characters (for Japanese Model and Traditional Chinese Model)

FS ! *n*

[Name] Select print mode(s) for Kanji characters

[Format]

ASCII	FS	!	*n*
Hex	1C	21	*n*
Decimal	28	33	*n*

[Range] $0 \le n \le 255$

[Default] $n = 0$

[Description] • Selects the character styles (double-height, double-width, and Kanji-underlined) together for multi-byte code character.

(*n*) Bit	Off/On	Hex	Decimal	Function
0, 1	Off	00	0	Reserved.
2	Off	00	0	Double-width canceled.
	On	04	4	Double-width selected.
3	Off	00	0	Double-height canceled.
	On	08	8	Double-height selected.
4 - 6	Off	00	0	Reserved.
7	Off	00	0	Kanji-underline mode is turned off.
	On	80	128	Kanji-underline mode is turned on.

FS &

[Name] Select Kanji character mode

[Format]

ASCII	FS	&
Hex	1C	26
Decimal	28	38

[Description] • Selects Kanji character mode.

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FS (A *pL pH fn [parameters]*

[Name] Select Kanji character style(s)

[Description]
- Selects the multi-byte code character style.
- *pL*, *pH* specify (*pL* + *pH* × 256) as the number of bytes after *pH* (*fn* and *[parameters]*).
- *fn* specifies the function.
- *[parameters]* specify the process of each function.

fn	Format	Function No.	Function name
48	**FS (A *pL pH fn m***	48	Select Kanji character font.

<Function 48> **FS (A *pL pH fn m*** (*fn* = 48)

[Name] Select Kanji character font

[Format]

ASCII	FS	(	A	*pL*	*pH*	*fn*	*m*
Hex	1C	28	41	*pL*	*pH*	*fn*	*m*
Decimal	28	40	65	*pL*	*pH*	*fn*	*m*

[Range] ($pL + pH \times 256$) = 2 (pL = 2, pH = 0)
fn = 48
$0 \le m \le 2$, $48 \le m \le 50$

[Default] *m* = 0

[Description]
- Selects multi-byte code character font (Kanji character font).

m	Kanji character font
0, 48	Kanji character font A (24 × 24)
1, 49	Kanji character font B (20 × 24)
2, 50	Kanji character font C (16 × 16)

[Note]
- This function is supported only in Japanese model.

FS – *n*

[Name] Turn underline mode on/off for Kanji characters

[Format]

ASCII	FS	–	*n*
Hex	1C	2D	*n*
Decimal	28	45	*n*

[Range] $0 \le n \le 2$, $48 \le n \le 50$

[Default] *n* = 0

[Description]
- Turns on or off underline mode for multi-byte code character (Kanji-underline).

n	Function
0, 48	Turns off Kanji-underline mode.
1, 49	Turns on Kanji-underline mode, set at 1-dot width.
2, 50	Turns on Kanji-underline mode, set at 2-dot width.

FS .

[Name] Cancel Kanji character mode

[Format]

ASCII	FS	.
Hex	1C	2E
Decimal	28	46

[Description] • Cancels Kanji character mode.

FS 2 *c1 c2 d1...dk*

[Name] Define user-defined Kanji characters

[Format]

ASCII	FS	2	*c1*	*c2*	*d1...dk*
Hex	1C	32	*c1*	*c2*	*d1...dk*
Decimal	28	50	*c1*	*c2*	*d1...dk*

[Range] The ranges of *c1* and *c2* differ, depending on the models and the character code system used.

Model	Hexadecimal	
	c1	*c2*
Japanese (JIS code)	*c1* = 77	21 ≤ *c2* ≤ 7E
Japanese (SHIFT JIS code)	*c1* = EC	40 ≤ *c2* ≤ 7E 80 ≤ *c2* ≤ 9E
Traditional Chinese	*c1* = FE	A1 ≤ *c2* ≤ FE

$0 \leq d \leq 255$
k = 72 [when Japanese model (Kanji character font A (24 × 24) is selected)]
k = 60 [when Japanese model (Kanji character font B (20 × 24) is selected)]
k = 32 [when Japanese model (Kanji character font C (16 × 16) is selected)]
k = 72 [when Traditional Chinese model]

[Description] • Defines the user-defined Kanji character pattern (*d1...dk*) specified by the character codes (*c1* and *c2*).

FS C *n*

[Name] Select Kanji character code system

[Format]

ASCII	FS	C	*n*
Hex	1C	43	*n*
Decimal	28	67	*n*

[Range] *n* = 0, 1, 48, 49

[Default] *n* = 0

[Description] • Selects a Kanji character code system for the Japanese model.

n	Kanji character code system
0, 48	JIS code
1, 49	SHIFT JIS code

FS S *n1 n2*

[Name]	Set Kanji character spacing				
[Format]	ASCII	FS	S	*n1*	*n2*
	Hex	1C	53	*n1*	*n2*
	Decimal	28	83	*n1*	*n2*
[Range]	$0 \le n1 \le 255$ $0 \le n2 \le 255$				
[Default]	$n1 = 0$, $n2 = 0$				
[Description]	• Sets the left-side character spacing of the multi-byte code character to [*n1* × (horizontal or vertical motion unit)]; sets the right-side character spacing of the multi-byte code character to [*n2* × (horizontal or vertical motion unit)].				

FS W *n*

[Name]	Turn quadruple-size mode on/off for Kanji characters			
[Format]	ASCII	FS	W	*n*
	Hex	1C	57	*n*
	Decimal	28	87	*n*
[Range]	$0 \le n \le 255$			
[Default]	$n = 0$			
[Description]	• Turns quadruple-size mode on or off for multi-byte code character. • When the LSB of *n* is 0, quadruple-size mode is turned off. • When the LSB of *n* is 1, quadruple-size mode is turned on.			

APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

1) Because the TM-P60 series printer is a line printer, it automatically feeds paper after printing the data.
   Therefore, when the line spacing for one line is set to a smaller value than the height of the print data, paper may be fed more than the set amount just to print the data.

Table A.1 Paper Feeding Amount (ANK Model)

	Required paper feeding amount (dots)
Font A	24 × number of times enlarged vertically
Font B	24 × number of times enlarged vertically
Font C	16 × number of times enlarged vertically

Table A.2 Paper Feeding Amount (Japanese Model)

	Required paper feeding amount (dots)
Font A	24 × number of times enlarged vertically
Font B	24 × number of times enlarged vertically
Font C	16 × number of times enlarged vertically
Kanji font A	24 × number of times enlarged vertically
Kanji font B	24 × number of times enlarged vertically
Kanji font C	16 × number of times enlarged vertically

2) When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects graphics.

3) Interval of autocutting operation in the receipt section
   For driving the autocutter of the receipt section, the interval should be a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the autocutter).

A.2 Notes on Printer Installation

- Connect the external power supply to the power supply connector of the printer. Then plug in the external power supply and turn it on if necessary. Be sure not to connect the external power supply with the wrong polarity. If it is connected incorrectly, the internal circuit fuse of the printer may be blown or the external power supply may be damaged.
- Both high and low voltage errors are shown in Table 3.6.3. The flashing patterns are shown in the table.
- When either a high or low voltage error occurs, turn off the power as soon as possible.

A.3 Other Notes

1) Printer mechanism handling

- Do not pull the paper out when the cover is closed.
- Because the thermal elements of the print head and driver IC are easy to break, do not touch them with any metal objects.
- Since the areas around the print head become very hot during and just after printing, do not touch them.
- Do not use the cover open button except when necessary, since the printer mechanism may be damaged.
- Do not touch the surface of the print head because dust and dirt can stick to the surface and damage the elements.
- Thermal paper containing a great deal of Na^+, K^+, and Cl^- ions can harm the print head thermal elements. Therefore, be sure to use only the specified paper.

2) Thermal paper handling

Notes on using thermal paper

Chemicals and oil on thermal paper may cause discoloration and faded printing. Therefore, pay attention to the following:

a) Use water paste, starch paste, polyvinyl paste, or CMC paste when gluing thermal paper.

b) Volatile organic solvents such as alcohol, ester, and ketone can cause discoloration.

c) Some adhesive tapes may cause discoloration or faded printing.

d) If thermal paper touches anything which includes phthalic acid ester plasticizer for a long time, it can reduce the image formation ability of the paper and can cause the printed image to fade. Therefore, when storing thermal paper in a card case or sample notebook, be sure to use only products made from polyethylene, polypropylene, or polyester.

e) If thermal paper touches diazo copy paper immediately after copying, the printed surface may be discolored.

f) Thermal paper must not be stored with the printed surfaces against each other, because the printing may be transferred between the surfaces.

g) If the surface of thermal paper is scratched with a hard metal object such as a nail, the paper may become discolored.

Notes on thermal paper storage

- Since color development begins at 70°C {158°F}, thermal paper should be protected from high temperatures, humidity, and light, both before and after printing.
  a) Store paper away from high temperatures and humidity.
  Do not store thermal paper near a heater or in enclosed places exposed to direct sunlight.
  b) Avoid direct light.
  Extended exposure to direct light may cause discoloration or faded printing.
- When the printer is not used for one week or more, it is recommended not to leave the thermal paper between the platen and the print head.

3) Others

- Because this printer uses plated steel, the cutting edges may be subject to rust. However, this does not affect the printer performance.

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APPENDIX B: PRINTER CLEANING

B.1 Cleaning Print Head

Paper dust on the heating elements may lower the print quality. In this case, clean the print head as follows:

1) Open the printer cover.

2) Clean the thermal elements of the print head using a cotton swab moistened with an alcohol solvent (ethanol, methanol, IPA).

NOTES: 1. Do not touch the print head thermal elements.

2. Do not scratch the print head.

3) Insert roll paper and close the print head.

NOTE: The print head becomes very hot just after printing and is very dangerous. Be sure to allow the print head to cool down (after printing) before cleaning it. Also, be sure to turn off the printer power before cleaning the print head and turn on after the alcohol salvent is dried out completely.

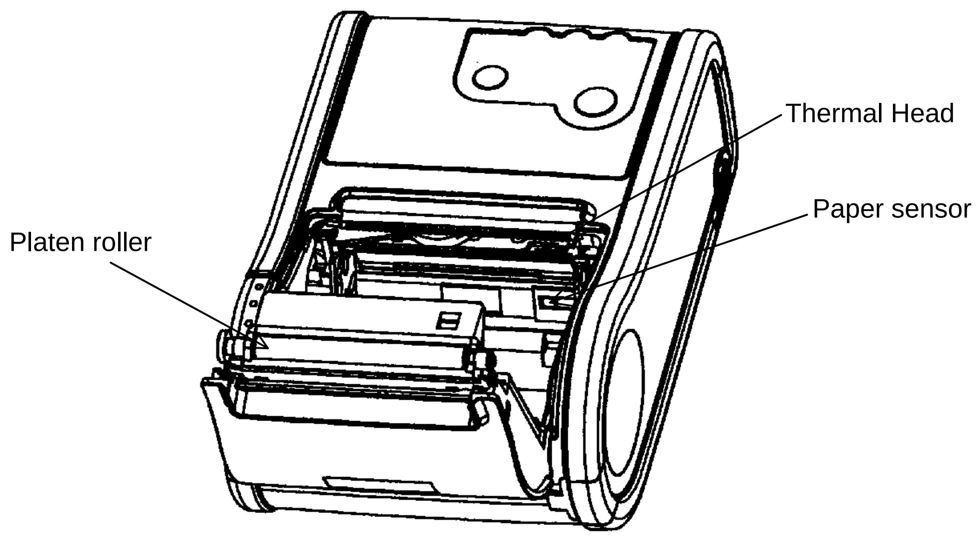


Figure B.1 Print Head Thermal Elements

(*) Depending on the roll paper used, paper dust may stick to the platen roller and paper sensor. To remove the paper dust, clean the platen roller and roll paper end sensor with a cotton swab moistened with water.
Also, be sure to turn on the printer power after water is dried out completely.

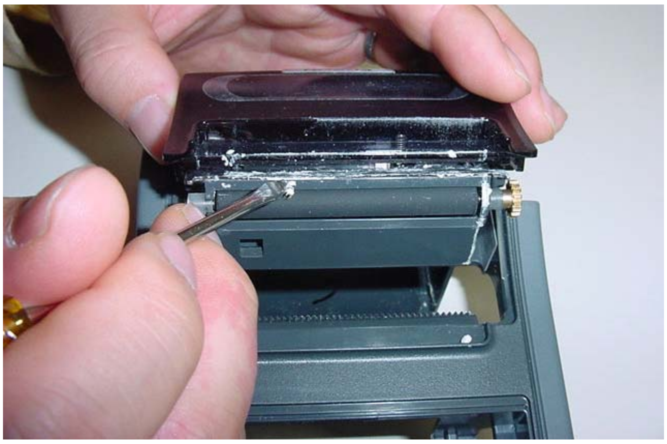
B.2 Cleaning the Autocutter

If the adhesive agent on the labels sticks to the autocutter, it may dull the blade. In this case, clean the blade as described below:

1) Be sure that the printer is turned off. Open the roll paper cover.
2) Collect and remove accumulated adhesive materials with a flathead screwdriver.



Adhesive Materials on the Blade



Removing Adhesive Materials with Flathead Screwdriver

Warning:

Be sure not to touch the edge of the autocutter directly with your fingers; otherwise, your fingers might be injured.

NOTE: Be sure to remove as much of the adhesive agent as possible from the cutter blade edge, but you do not need to polish the blade until it is absolutely clean. It is recommended not to use an alcohol solvent. If an alcohol solvent is used, the adhesive agent might begin to be dissolved, which can reduce the efficiency of the printer.

APPENDIX C: CODE128 BAR CODE

C.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

- Code set A: ASCII characters 00H to 5FH
- Code set B: ASCII characters 20H to 7FH
- Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

  The following special characters are also available in CODE128:

- SHIFT characters

  In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.

- Code set selection character (CODE A, CODE B, CODE C)

  This character switches the following code set to code set A, B, or C.

- Function character (FNC1, FNC2, FNC3, FNC4)

  The usage of function characters depends on the application software. In code set C, only FNC1 is available.

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C.2 Code Tables

1) Printable characters in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
HT	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B,31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66
SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

2) Printable characters in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
_	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,66
6	36	54	^	5E	94	CODEC	7B,43	123,67
7	37	55	_	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

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3) Printable characters in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
00	00	0	40	28	40	80	50	80
01	01	1	41	29	41	81	51	81
02	02	2	42	2A	42	82	52	82
03	03	3	43	2B	43	83	53	83
04	04	4	44	2C	44	84	54	84
05	05	5	45	2D	45	85	55	85
06	06	6	46	2E	46	86	56	86
07	07	7	47	2F	47	87	57	87
08	08	8	48	30	48	88	58	88
09	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66
23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			

APPENDIX D: NOTES ON UPDATING THE MAINTENANCE COUNTER AND TURNING THE PRINTER'S POWER OFF

D.1 About updating the maintenance counter

- This printer has a maintenance counter function, as described in the command description for **GS g 0** and **GS g 2**.
- The values of the maintenance counter are automatically stored in the NV memory every 2 minutes when the printer is operating.

APPENDIX E: NOTES ON USING THE ASB STATUS

Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmission shall be transmitted together at one time as one ASB status, showing the presence of change (a), followed by the latest ASB status (b).

Example: In the normal (wait) state, the ASB status is configured as follows.

First Status	Second Status	Third Status	Fourth Status
0001 0000	0000 0000	0000 0000	0000 1111

When a sequence of operations is performed,

1) the printer cover is opened, 2) the paper is removed, then the printer cover is closed, 3) the printer cover is opened, and then 4) the printer cover is closed, the printer sends the ASB as follows:

	First Status	Second Status	Third Status	Fourth Status	
1)	0011 1000	0000 0000	0000 0000	0000 1111	Near end detection
2)	0001 1000	0000 0000	0000 1100	0000 1111	The printer cover is opened.
3)	0011 1000	0000 0000	0000 1100	0000 1111	The printer cover is closed.
4)	0001 1000	0000 0000	0000 1100	0000 1111	The printer cover is closed.

When the ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted as follows.

	First Status	Second Status	Third Status	Fourth Status
(a)	0011 1000	0000 0000	0000 0011	0000 1111

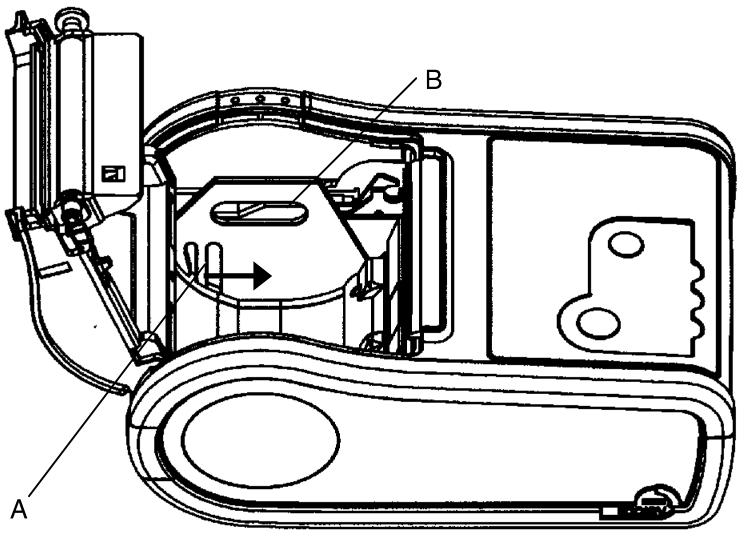
	First Status	Second Status	Third Status	Fourth Status
(b)	0001 1000	0000 0000	0000 1100	0000 1111

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APPENDIX F: NOTES ON USING THE ROLL PAPER SPACER FOR THE 58-MM PAPER WIDTH

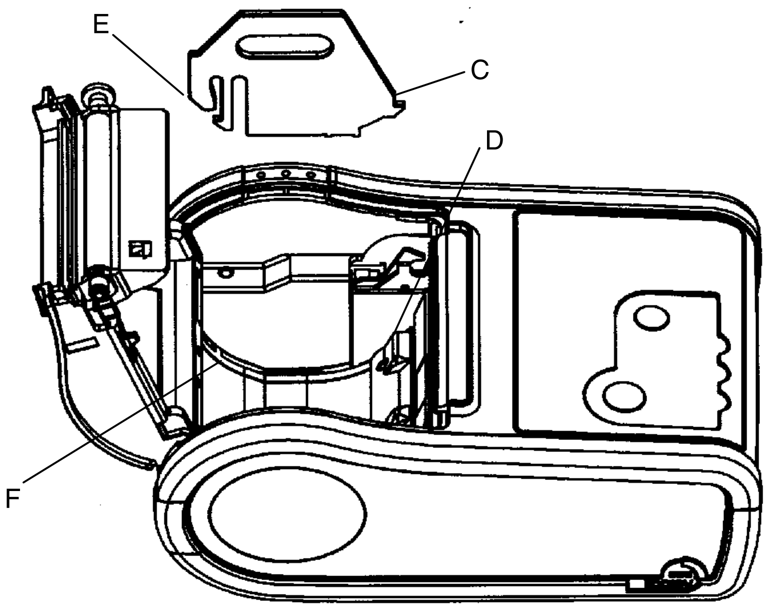
1) Removing the roll paper spacer

Pull the part B in the figure below while pushing the part A with the tools such as flathead screwdriver toward the arrow so that the spacer can be removed.



2) Installing the roll paper spacer

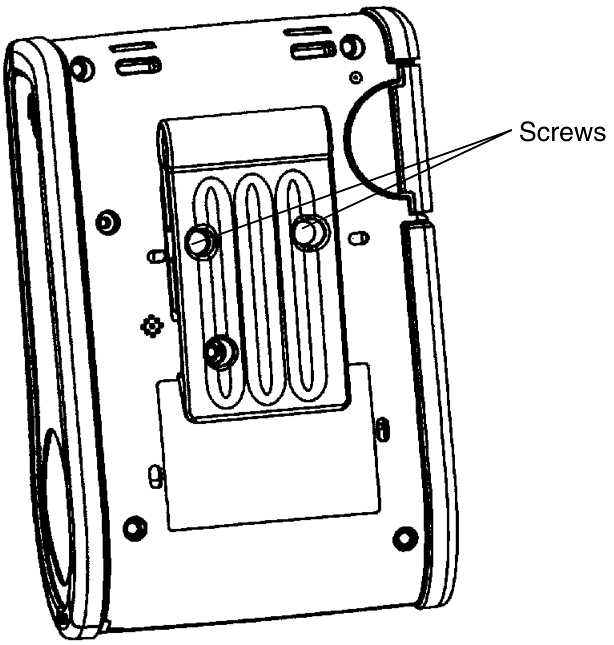
Insert the part C of the spacer to the part D of the printer, then insert the part E of the spacer to the part F of the printer.



APPENDIX G: NOTES ON USING THE BELT CLIP

1) Removing the belt clip

When the printer is used horizontally, it is recommended to remove the belt clip.
To remove the belt clip, remove two screws as the figure below shows.



2) About the fixing screw for the belt clip

When the belt clip is provided by the user, it is recommended to use the screw type as shown below. Take in consideration that the screw may not reach enough depending on the thickness of the belt clip.

Recommended fixing screw: C.P.T – B screw (3 × 12)

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APPENDIX H: NOTES ON THE SERIAL CABLE

When the serial cable is connected to the printer, do not stress the cable. Doing so may damage the serial cable and the serial connector.

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APPENDIX I: PRECAUTIONS FOR USE

1) When you have not used the printer more than one week, recharge before using it.
2) When you will not use the printer for a long term, remove the battery before you store the printer.
3) You are recommended to use the printer at room temperature (10 to 30°C {50 to 86°F})
4) The indication of the remaining battery is a rough measure. You are recommended to immediately replace the battery after the "level L" of the remaining amount has been indicated.
5) If the "level L" is indicated soon after charging, immediately replace the battery with new one because its life has expired. (Rough measure of the life: approximately 500 times of charging and discharging)
6) Never use batteries other than specified one because using them is very dangerous.
7) Never use chargers other than specified one because using them is very dangerous.
8) Do not remove the battery during charging.
9) When the printer is used near a microwave, the wireless communication may be poor. In this case, use the printer away from the microwave or change the channel to one that does not interfere.
10) When a battery charging error is indicated, immediately remove the AC adapter and the battery. Do not use the battery because it may be out of order.
11) Charging time differs depending on the environment and the battery itself.
12) Charging LED may not light up if the battery is not installed properly. Remove the battery and install it again.
13) Do not unplug the AC adapter during printing regardless of the amount of the remaining battery.
14) Print density may differ depending on the environment or battery amount (voltage).
15) When the temperature differs between the battery and the environment, the remaining amount is not indicated correctly. You are recommended to leave the battery in the environment where it will be used for a while before use.
16) When exchanging the battery, make sure to turn the power off in advance.
17) Be sure to use the POWER button to turn the power off. If the battery is disconnected while the printer is operated with the battery or if the AC adapter is disconnected while the printer is operated with the AC adapter, the wireless communication may be not work the next time of use.